®

Welch Allyn

Service Manual

AudioScope™/ AudioScope 3™

Screening Audiometers

Single Hearing Level Models: 23020, 23000, 23040
Three Hearing Level Model 23300
Charging Stand 71123
Charging Transformers: Australia - 71036, Europe - 71032, Japan -71030,
United Kingdom 71034, United States - 71040

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PN: 230260 Rev. B

Revision History

ECN#/ ECO#	Revision	Date	Section	Title	Author	Description
5-32904	A	5/31/96	1	General Info.	RJS	Intro of Document
5-32904	A	5/31/96	2	Service	RJS	Intro of Document
5-32904	A	5/31/96	3	Troubleshooting	RJS	Intro of Document
5-32904	A	5/31/96	4	Disassembly/Repair	RJS	Intro of Document
5-32904	A	5/31/96	5	Drawings/Specs.	RJS	Intro of Document
1001574	B	6/17/04		Soldering	BSW	Added Soldering Temperatures

Drawings and/or illustrations and/or part numbers in this document are for reference only. For the most current revision call the Welch Allyn Customer Service phone number listed in Section 1.

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Section 1:

General Information

1.1 To Service Personnel

Read and understand the AudioScope operating instructions manual pn. 230231-2. The information in this Service Manual is subject to change without notice and should not be construed as a commitment by Welch Allyn. Welch Allyn assumes no responsibility for any errors that may appear in this manual.

Who to contact:

If the product and/or its operation varies significantly from any description therein, please contact:
Welch Allyn Medical Products Division
Product Service Department,
4341 State Street Road, Skaneateles Falls, NY, 13153-0220, U.S.A.
Phone (315) 685-4445, or (800) 669-9771.
Fax (315) 685-4653

This product has been designed to provide a high degree of safety and reliability. However, we cannot guarantee against the deterioration of components due to aging and normal wear.

All service and repairs must be done by authorized Welch Allyn personnel or agents, using approved Welch Allyn replacement parts and approved process materials. Failure to do so will invalidate the product warranty. Please refer to the product warranty for specific coverage.

USING ADHESIVES: ALWAYS WEAR SAFETY GLASSES AND PROVIDE ADEQUATE VENTILATION WHEN USING CA ADHESIVES, CA ACCELERATORS, AND RTV ADHESIVE SEALANTS. READ AND OBEY WARNINGS, CAUTIONS, INSTRUCTIONS, AND RECOMMENDATIONS PRINTED ON CONTAINER AND CORRESPONDING MSDS SHEETS

CAUTION: PRIOR TO DOING REPAIR WORK, UNPLUG POWER CORD ON CHARGER TO ELIMINATE SHOCK HAZARD. USE GROUNDING MAT AND GROUNDING STRAP TO REDUCE CHANCES OF DAMAGE TO ASIC IN HANDLE.

1.2 Limited Warranty

Welch Allyn warrants the AudioScope, when new, to be free of defects in material and workmanship and to perform in accordance with the manufacturer's specifications for a period of one year from the date of purchase from Welch Allyn or its authorized distributors or agents.

Welch Allyn will either repair, replace or recalibrate any components (except lamps) found to be defective or at variance from the manufacturer's specifications within this time at no cost to the customer, except for transportation expenses. For rechargeable batteries, warranty is extended to two years. It shall be the purchaser's responsibility to return the instrument directly to Welch Allyn or to an authorized distributor, agent or service representative.

This warranty does not include breakage or failure due to tampering, misuse, neglect, accidents, modification or shipping. This warranty is also void if the instrument is not used in accordance with the manufacturer's recommendations or if repaired by other than a Welch Allyn or authorized agent. This warranty can be extended to a three-year period provided the instrument is returned for recalibration annually. Submission of instrument registration card is required. Purchase date determines warranty and recalibration requirements. No other express warranty is given.

To receive service assistance or to ask questions regarding this warranty, please call or write:

Welch Allyn Product Service Dept.
Welch Allyn, Inc.
Medical Products Division
4341 State Street Road
Skaneateles Falls, New York 13153 USA
1 (800) 669-9771 or (315) 685-4445

Note: The U.S. Occupational Safety and Health Administration (OSHA) recommends that audiometers be calibrated annually. Arrangements for calibration can be made by returning the instrument registration card. In addition a daily biological check may be performed. This is accomplished by a person with known normal hearing who listens to the tones for intensity and quality. There is a moderate fee for recalibration. *Re-printed from PN230108, Instrument Registration Card

1.3 Introduction to AudioScopes

The Welch Allyn AudioScope (audiometer) enables the practitioner to perform a fast, painless and objective test for early hearing loss. The AudioScope3 starts with a Practice Tone (PT) of 1,000 Hz at a dB HL dependent upon the selected Screening dB HL.(Refer to Page 5 of Operating Instructions). After the Practice Tone (PT), the AudioScope3 provides screening at all four speech frequencies: 1,000 Hz, 2,000 Hz, 4,000 Hz, and 500 Hz. This test can be performed at one of three hearing levels: 20 dB, 25 dB, or 40 dB. Selection of the hearing level is dependent on the age of the patient. Note: there is no PT with single level AudioScopes. If a hearing problem is suspected, the patient is referred to a specialist for diagnosis.

The AudioScope contains a 3.5-volt halogen lamp and otoscope lens for viewing the tympanic membrane and the ear canal prior to and during hearing screening.

There are two types of Welch Allyn AudioScopes in use today:

- The first type is the **single hearing level** instrument of which there are three models. Although they are obsolete, they can still be calibrated if they are functioning according to specifications. Service parts are not available.

  AudioScope pn 23020 - 20 dB (no PT)
  AudioScope pn 23000 - 25 dB (no PT)
  AudioScope pn 23040 - 40 dB (no PT)

- The second type is the **three hearing level (MultiLevel)** AudioScope3. (Also known as AudioScope II) There are two versions of this second type.

  AudioScope3 pn 23300 - 20, 25, 40 dB (1000 Hz PT)

The **original version** of the AudioScope 3 (**three hearing level)** up to and including serial number 969999 utilizes an ASIC module. This instrument is calibrated by adjusting miniature potentiometers on the printed circuit board. Although the main board/ASIC is being phased out at the time of this writing, they can still be calibrated if they are functioning according to specifications. Some parts are available. (See Repair Parts, Section 2.2)

NEW VERSION:

A **new version** (starting in 1996 with serial number 967000) differs from the first AudioScope3 in that a Microcontroller is used instead of the ASIC. Performance specifications of the new AudioScope 3 are identical to the earlier AudioScope 3, and the part number remains the same. Since this version utilizes a Microcontroller with digitally adjusted pots and not mechanical potentiometers, calibration is much easier. Tool T-13765 is used to electronically adjust the board. This advance eliminates the limitations of mechanical potentiometers and reduces calibration time.

1.3 Introduction to AudioScopes

The operation and calibration of all five of these screening audiometers are explained in this manual.

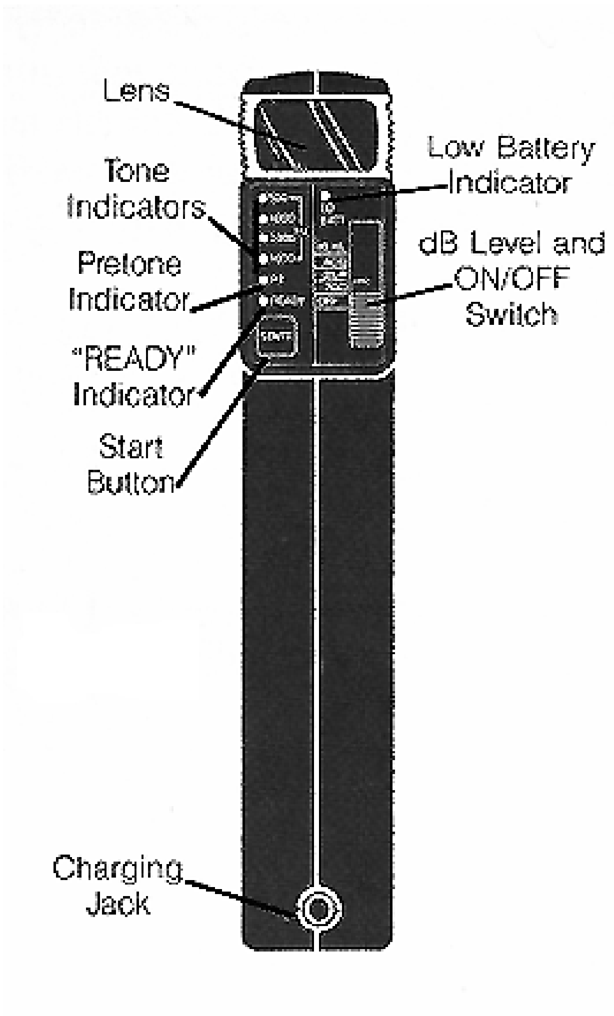
Important note to Service Personnel

Board Replacement on AudioScope 3:
Welch Allyn manufactures only the AudioScope3 as of Oct. 1986. As of 1996, starting with serial no.967000 a new version AudioScope3 utilizes a Microcontroller (does not have ASIC) and is calibrated using the T-13765 Calibrator Box. It has digital potentiometers for calibration, not mechanical pots. All previous models were calibrated using mechanical potentiometer. Calibration of all types of AudioScopes is explained in this manual. If the ASIC fails on an AudioScope 3, the whole board will be replaced with the new board containing the digitally adjustable Microcontroller. This board will fit the AudioScope3 with no modifications. Unit performance is the same.

Obsolescence of Single Level AudioScope:
Single Level AudioScopes are over ten years old. Service Parts are not available. Recalibrations CAN be performed on properly functioning single level AudioScopes. For failed units, save the lamp, battery, and charging stand/transformer for use with AudioScope3.

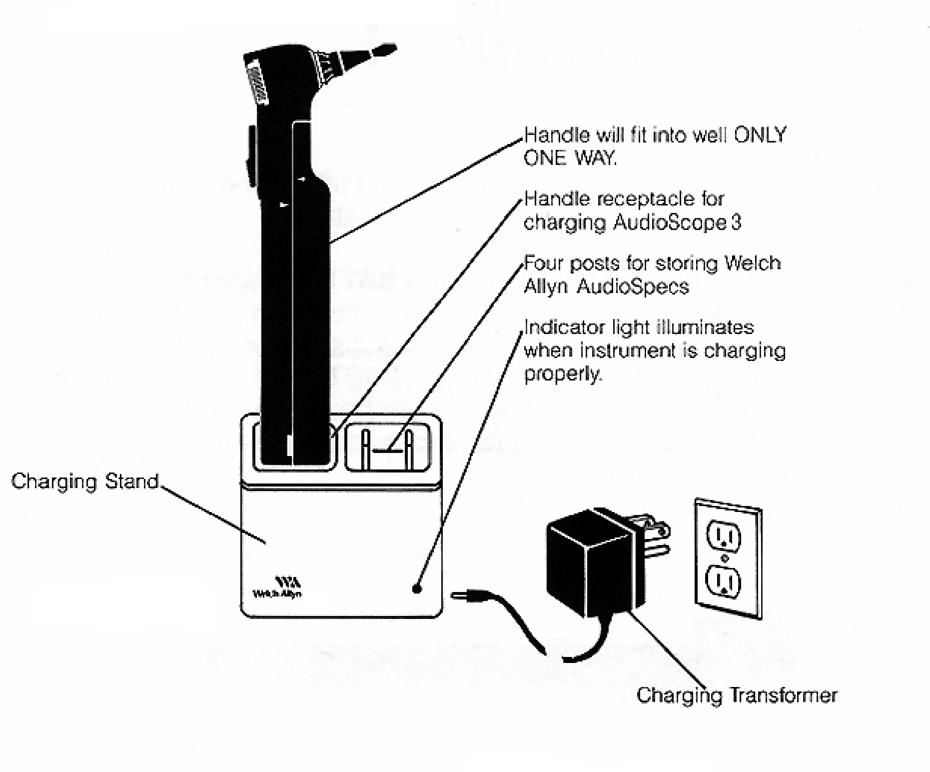
1.3 Introduction to AudioScopes

AudioScope 3 Handle Controls and features are shown in the figure below.



1.4a Basic System Description

There are three components to the Welch Allyn AudioScope: the hand held AudioScope handle, the Charger stand and transformer.



1.4b AudioScope Charging Stand

The charging stand holds the handle and specs and is the interface between the Handle and the charging current of the wall transformer. Insertion of the handle into the charging well completes the charging circuit. An LED illuminates when the handle is in the well and the charging circuit is complete.

1.5 Use of the AudioScope (Screening)

Read pg. 6-8 of Operating Instructions pn230231-2 (shown below) for full details of the screening procedure.

Note: The following excerpt is only an outline intended for general familiarization by service personnel. This outline is not intended to replace above referenced Operating Instructions pn 230231-2.

1. Check that lens is centered in the instrument.
2. Select an area that is relatively quiet and free from distracting sounds. *See page 26 of Operating Instructions for Maximum Permissible Ambient Noise for the different screening levels.*
3. Select appropriate size specula and twist onto instrument. **USE ONLY GRAY-TIPPED WELCH ALLYN AUDIOSPECS.**

1.5 Use of the AudioScope (Screening) continued

4. Turn AudioScope3 "**ON**" by sliding the selection switch to the desired screening level.
5. Instruct patient to respond appropriately to sound. Insert the tip of the speculum into the ear canal. Position the tip so that the tympanic membrane or a portion of it can be visualized.
6. Depress **START** button and observe each tone and the patient's response. Repeat these steps for opposite ear.
7. Remove instrument from patient's ear and turn off. Return to the Charging stand. (REFER TO Operating Instructions).

1.6 **Operating Program** of Models **23020, 23000, 23040** Single Hearing Level AudioScope

NOTE: Since these models of AudioScopes are well over ten years old, the circuitry is no longer available. If this circuitry fails, the Single Level AudioScope is no longer repairable. Recalibrations CAN be performed if the unit is functioning properly. If the unit fails, however, the lamp, battery, and charging stand/transformer can be re-used with the AudioScope3.

See Fig. 1-6 Block Diagram of Welch Allyn AudioScope.

- **SINGLE HEARING LEVEL** AudioScope models (20,25,40 dB) use the same basic circuitry except for **the value of R 21 and the adjustments on VR2.**

Model:	Ohms of R21:
20 dB AudioScope =	11 Ohms
25 dB AudioScope =	20 Ohms
40 dB AudioScope =	130 Ohms

1.6 Operating Program: 23020, 23000, and 23040
Single Hearing Level AudioScope

Sequence:	Cause:	Effect:
1. Manual	Switch "ON"	**Lamp "ON", Ready LED "ON"**
2. Manual	Press "START"	U4 activated
3. Logic	pin 11 goes to 0v	activates LED (500 Hz LED.)
	U4 pulls pin 20 to 0v	selects resistance between pin 7 of U2 and ground.
	this charges C5	produces 500 Hz sine wave at pin 2 of U2
	U4 also selects resistance between pin 14 of U4 and pin 5 of U3.	this resistance is adjusted for the output amplitude of the 500 Hz tone only and is used to control output amplifier U3.

(Process repeats for the 1000 Hz, 2000 Hz, and 4000 Hz tones.)

4. Logic	pin 4 goes to 0v	activates LED (1000 Hz LED.)
	U4 pulls pin 22 to 0v	selects resistance between pins 7 of U2 and ground.
	this charges C5	produces 1000 Hz sine wave at pin 2 of U2
	U4 also selects resistance between pin 15 of U4 and pin 5 of U3.	this resistance is adjusted for the output amplitude of the 1000 Hz tone only and is used to control output amplifier U3.
5. Logic	pin 12 goes to 0v	activates LED (2000 Hz LED.)
	U4 pulls pin 21 to 0v	selects resistance between pin 7 of U2 and ground.
	this charges C5	produces 2000 Hz sine wave at pin 2 of U2

1.6 Operating Program: 23020, 23000, 23040
Single Hearing Level AudioScope continued

Sequence:	**Cause:**	**Effect:**
	U4 also selects resistance between pin 17 of U4 and pin 5 of U3.	this resistance is adjusted for the output amplitude of the 2000 Hz tone only and is used to control output amplifier U3.
6. Logic	pin 3 goes to 0v	activates LED (4000 Hz LED.)
	U4 pulls pin 1 to 0v	selects resistance between pin 7 of U2 and ground.
	this charges C5	produces 4000 Hz sine wave at pin 2 of U2
	U4 also selects resistance between pin 16 of U4 and pin 5 of U3.	this resistance is adjusted for the output amplitude of the 4000 Hz tone only and is used to control output amplifier U3.
7. Logic	cycle completes itself	Ready LED illuminates
8. Manual	switch off	**unit deactivates, lamps & logic off**

1.7a Operating Program: 23300 (ASIC TYPE) up to and including serial no.9609999

Multi-Level AudioScope3 ASIC

The **Three Hearing Level** AudioScope3 up to and including Serial Number 960999 uses an ASIC (single application specific integrated circuit) Microprocessor. This component ***is not a service part***. **If the ASIC Microprocessor should fail, it will be necessary to replace the Circuit Board/ASIC assembly with the new *Microcontroller* based circuit board Part No.** This is an easy replacement and does not affect unit operation. Calibrate the ***Microcontroller*** based AudioScope3 with T-13765 AudioScope Calibrator Box explained in Section 2.7.11

Tone Generation:
External resistors and capacitors are used to generate four different tones at hearing levels of 20, 25, 40 dBs. The output amplitude is determined by SW2, which selects one resistor for a hearing level of 20, 25, or 40 dBs respectively.

Operation begins with switching the unit ***ON***. The examination halogen lamp illuminates immediately. When the start button is depressed, the AudioScope begins to generate a sequence of tones starting with PT of 1000 Hz, which is 20 dB higher than the manually selected specific hearing level. Then the 1000 Hz, 2000 Hz. , 4000 Hz and 500 Hz tones are generated in that order at the same hearing level. When the cycle is complete, the AudioScopes returns to the ready state indicated by the Green "Ready" LED. The whole cycle is completed in less than 20 seconds.

1.7a Operating Program: 23300 (ASIC TYPE) up to and including serial no.9609999

Multi-Level AudioScope3 ASIC

Sequence:	Cause:	Effect:
1. Manual	Switch "ON"	**Lamp "ON", Ready LED "ON"**
2. Manual	Press "START"	ASIC activated
3. Logic	pin 20 goes low	activates PT (PreTone) LED (D6)
	PreTone 1kHz sine wave appears at ASIC Pin 4 and is amplified and then applied to speaker from ASIC Pin 7	Speaker produces 1 kHz PreTone

(General cycle is repeated for TEST tones: 1000 Hz, 2000 Hz, and 4000 Hz and 500 Hz)

4. Logic	ASIC Pin 21 goes low 1kHz sine wave appears at ASIC Pin 3 and is amplified and then applied to speaker from ASIC Pin 7	activates 1 kHz LED (D5) Speaker produces 1 kHz Tone
5. Logic	ASIC Pin 22 goes low 2kHz sine wave appears at ASIC Pin 6 and is amplified and then applied to speaker from ASIC Pin 7	activates 2 kHz LED (D4) Speaker produces 2 kHz Tone
6. Logic	ASIC Pin 23 goes low 4kHz sine wave appears at ASIC Pin 5 and is amplified and then applied to speaker from ASIC Pin 7	activates 4 kHz LED (D3) Speaker produces 4 kHz Tone

1.7a Operating Program: **23300 (ASIC TYPE) up to and including serial no.9609999**

Multi-Level AudioScope3 ASIC

<u>**Sequence**</u>:	<u>**Cause:**</u>	<u>**Effect:**</u>
7. Logic	ASIC Pin 24 goes low 500 Hz sine wave appears at ASIC Pin 2 and is amplified and then applied to speaker from ASIC Pin 7	activates 500 Hz LED (D2) Speaker produces 500 Hz Tone
8. Logic	cycle completes itself and activates D1	Ready LED illuminates
9. Manual	switch off	<u>**unit deactivates, lamps & logic off**</u>

1.7b Operating Program: 23300 (Microcontroller type serial no.9670000 and higher)

Multi-Level AudioScope3 (Microcontroller/non ASIC)

Sequence:	Cause:	Effect:
1. Manual	Switch "ON"	**Lamp "ON",Ready LED "ON"**
2. Manual	Press "START"	MICRO activated
3. Logic	U4 pin 9 goes to 3 V	activates PT (PreTone) LED (D3)
4. Logic	U4 pulses pin 4	U4 ramps U5 (digital pot) to calibrated level. This establishes feedback resistance for U3C.
	U4 sequentially toggles pin 19, 20, 21, 22	Generates digital base amplitude sinewave at pin TP10

General cycle is repeated for TEST tones : 1000, 2000, 4000, and 500 Hz.

5. Logic	U4 pin 8 goes to 3 V	activates 1000 Hz LED (D4)
	U4 pulses pin 4	U4 ramps U5 (digital pot) to calibrated level. This establishes feedback resistance for U3C.
	U4 sequentially toggles pin 19, 20, 21, 22	Generates digital base amplitude sinewave at pin TP10
6. Logic	U4 pin 7 goes to 3 V	activates 2000 Hz LED (D5)
	U4 pulses pin 4	U4 ramps U5 (digital pot) to calibrated level. This establishes feedback resistance for U3C.
	U4 sequentially toggles pin 19, 20, 21, 22	Generates digital base amplitude sinewave at pin TP10

1.7b Operating Program: 23300 (Microcontroller type serial no.9670000 and higher) (continued)

Multi-Level AudioScope3 (Microcontroller/non ASIC)

Sequence:	Cause:	Effect:
7. Logic	U4 pin 6 goes to 3 V	activates 4000 Hz LED (D6)
	U4 pulses pin 4	U4 ramps U5 (digital pot) to calibrated level. This establishes feedback resistance for U3C.
	U4 sequentially toggles pin 19, 20, 21, 22	Generates digital base amplitude sinewave at pin TP10
8. Logic	U4 pin 5 goes to 3 V	activates 500 Hz LED (D7)
	U4 pulses pin 4	U4 ramps U5 (digital pot) to calibrated level. This establishes feedback resistance for U3C.
	U4 sequentially toggles pin 19, 20, 21, 22	Generates digital base amplitude sinewave at pin TP10
9. Logic	cycle completes itself and activates D2	Ready LED illuminates
10. Manual	switch off	**unit deactivates, lamps & logic off**

1.8 Technical Specifications

- **Charging Stand:**
  Model# Application:
  71123 Charging Stand for all models of AudioScope
  Charging Transformers
  Model#: Application:
  71040 USA and Canada
  71036 Australia
  71032 Europe
  71030 Japan
  71034 United Kingdom

- **Handles:**

Frequencies	-	500, 1000, 2000, 4000 Hz +/- 3%
Distortion	-	Less than 3% total harmonic distortion as measured at transducer input
Rise/fall times	-	20 to 200 msec. as measured between the -1 and -20 dB points
Tone duration	-	1.5 seconds +/- 0.2 seconds
Pause between tones		Varied between 1.0 and 2.0 seconds
Sound level	-	Sound levels were established by threshold loudness balance method to TDH-39 receiver with MX41/AR cushion per ANSI S3.6-1969 Ref. Thresholds. These levels were established in an independent study and are equivalent to standard audiometric headphones. +/- 3 dB @ 500, 1000, and 2000 Hz, +/- 4 dB @ 4000 Hz.

This corresponds to the following absolute sound pressure levels when the instrument is coupled to an occluded ear simulator per ANSI Std. No. S3.25-1979:

Freq.	For 20 dB HL	for 25 dB HL	for 40 dB HL
500	28.2 - 31.6	33.2 - 36.6	48.2 - 51.6
1000	26.3 - 28.3	31.3- 33.3	46.3 - 48.3
2000	31.1 - 34.2	36.2 - 39.2	51.2 - 54.2
4000	32.0 - 35.8	37.0 - 40.8	52.0 - 55.8

Lamp	-	3.5v Halogen, 20 hr avg. life
Battery	-	3.5v nickel cadmium rechargeable pn72300 650 mA/hr.
Continuous use	-	50 minutes (approx) between full charge

Section 2:

Service

2.1 Intent of Service Manual

This manual provides technical assistance to trained service personnel for diagnosing, repairing, calibrating/testing the AudioScope handle and Charging Stand and replacing parts listed in Section 2.2. See the table of contents for a complete listing of manual contents.

Welch Allyn part numbers (PN#), and material numbers (M#), appearing in this manual are current at the date of publication. Order replacement parts by referencing your latest bill of materials or parts catalog. Part number changes, product updates, or new test procedures should be noted on the appropriate page of this manual by the manual owner. Notices announcing these changes should be attached to the manual.

Caution: prior to doing repair work, unplug power cord on charger to eliminate shock hazard. Use grounding mat and grounding strap to reduce chances of damage to ASIC in handle.

Caution when using adhesives: Always wear safety glasses and provide adequate ventilation when using adhesives, accelerators, and RTV adhesive sealants. Read and follow all appropriate recommendations in corresponding MSDS sheets.

2.2 Repair Parts for AudioScopes

Note: Order parts from most recent Bill of Materials/Repair:
The attached bill of materials shows replacement parts, which are available from Welch Allyn.

Part number	**Description**
711427-501	Housing assembly Charging stand
711413	Holder f/handle & specula
711419-501	Rubber feet (set of 4)
711418-501	Base plate assembly
711421	Mounting hardware kit
711420	#6 x 3/4 PHPS HD screw self tap
230035-2	Miniature transducer
230038	Transducer boot
230029-1	Stabilizing grommet
200055-502	Lens holder assembly
230073-505	Housing assembly
230080-502	Cover assembly
230201-501	Electronics module assembly AS3*
710205	Power jack
72300	3.5-volt rechargeable battery
06200	3.5-volt halogen lamp

*Single level AudioScope modules pn 230001-501 are No longer Available.

2.3a Lists of Tools/Fixtures/Documents for Service and Calibration*

* The U.S. Occupational Safety and Health Administration (OSHA) recommends that audiometers be calibrated annually. Arrangements for calibration can be made by returning the instrument registration card. In addition a daily biological check may be performed. This is accomplished by a person with known normal hearing who listens to the tones for intensity and quality. There is a moderate fee for recalibration.

Properly trained technicians will need specialized commercially available test equipment, custom made (Welch Allyn T-tools) specialized tools and fixtures, basic electronic hand tools and Welch Allyn specifications and drawings to properly diagnose, calibrate, and repair the AudioScope and charger base.

Item description:	Function:	T #&M#
B&K 2231 Modular Precision Sound Level Meter	Measures sound output	
B&K 4134 1/2" Microphone	Sound pick-up	
B&K 1625 1/3 to 1 Filter	Acoustic filter	
B&K Power Supply (6 V.D.C.)	Powers B&K 2231	
Knowles DB100-R 496 Occluded Ear Simulator	Connects T-1393 and T-2011	
Knowles DB-009 Teflon washers	Seals microphone and DB-100 connection	
Fluke 1900A Frequency Counter (3% accuracy)	Calibration and testing	
Oscilloscope Tektronix 2230A or Equiv. (storage type)	Calibration and testing	
ESD mat and wrist-strap	Repair	
Electronic Technicians hand tools kit	General Repair	
Digital Volt Ohm Meter	Troubleshooting/Repair	
PACE Soldering Equipment* *Set iron to 700ºF +/- 27ºF	Repair	T19102-2
Rosin Core Solder, .020", 63Sn/37Pb	Repair	M-31446
G.E. RTV 108 (Clear/Thick)	Repair	M-30313
Power Supply (0 - 5 VDC @ 1 Amp)	Testing	T-3769
AudioScope Holding Device	holds AudioScope	T-1539
Coupling Tool for Microphone	Holds AS to DB-100 assembly	T-1393
Latchup Box for AudioScope 1 and AudioScope3 with ASIC s/n <=969999	Holds Tones	T-9783
Microphone Handle Cover	Holds Microphone to DB-100	T-2011
AudioScope Calibrator for Microcontroller digital adjust (non ASIC)		T-13765
Charging jack pin-spanner	charging jack ring nut tool	T-10912

2.3a Lists of Tools/Fixtures/Documents for Service and Calibration*

Drawing#	Description	Size/# sheets
A02030	Repair Calibration Spec. for AudioScope II	B/1 of 1
A00277	Audiometer Handle Test Specifications	D/1 of 1
A00984	P.C.B. Test Spec AudioScope II	D/1 of 1
A00273	Electronics Module Test Specification	D/1 of 2
A00273	Electronics Module Test Specification	D/2 of 2
A00985	Audio Module III Test Spec	D/1 of 1
A01825	AudioScope III Sound Equipment Calibration and Setup	C/1 of 1
A00942	Charging Stand Electrical Test Spec.	A/1 of 1
230230	Audio II Schematic (PCB for ASIC version)	D/1 of 1
230215	PC Board Ass'y (for ASIC version	D/1 of 1
236630	PCB Schematic (for Microcontroller version)	B

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711408-2	No. 71123 Charging Stand	A/1 of 1

2.3b Tools and Fixtures Setup for Calibration AudioScope and AudioScope 3

s/n<=969999 (ASIC)

Figure 2.3b Calibration Set-up for AudioScopes with ASIC

2.3c Tools and Fixtures Setup for Calibration

AudioScope 3 s/n >=970000

(Microcontroller)

2.4 Training

The AudioScope is a sophisticated audiometric device and must be serviced and calibrated by trained. They must possess demonstrated skills in this area using specialized and calibrated sound measuring equipment. This Service Manual is the basis for delivering competency-based skills training to technicians or service engineers who already possess knowledge and skills in the use of electronic equipment as listed in the specialized test equipment Section 2.3. They must also be able to properly use certain commercially available equipment and hand tools for diagnosis, calibration, assembly, and board level repairs of the AudioScope and charger base. See Fig.2.3

This manual provides specific information for diagnosing, repairing, calibrating and testing the AudioScope handle and Charging Stand. Refer to the Table of Contents for complete information on the manual.

Use this manual for Self Training. Have an AudioScope system on hand to help with familiarization and repair practice. Read each complete repair step before starting hands-on practice.

Use this manual for Group Training. The technician will acquire and retain service information and service skills for the AudioScope product because of well prepared and executed training sessions. Conduct detailed demonstrations of required repair tasks then allow time for supervised practice. Set up sessions to allow the trainee time to individually practice all repair procedures. Evaluate trainee progress by observing trainee performance and then recording it on the appropriate form. Each trainee must have the opportunity to practice the procedure(s) after the instructor has demonstrated it.

- Tell them how and why.
- Show them how with explanations.
- Provide for supervised practice by the trainees.
- Record results and conduct follow-up training as necessary.

2.5 Calibration Procedure: Single Level AudioScope

- **Incoming bench checks**: Prepare the AudioScope for calibration.

  2.5.1 ___ Check the tightness of the two slotted screws near battery positive spring

  2.5.2 ___ Check the tightness of the charger jack

  2.5.3 ___ Remove RTV from the potentiometers

  2.5.4 ___ Check that the sound tube extends at least 1/16" to 1/8" into the cavity behind the lens. If it does not, move it upwards. Use fingers. Long nose pliers could bend or crush the sound tube See Figure 2.5.4 below

- **Preparation of Sound Equipment:**

  2.5.5 ___ Set up your sound equipment as per "AudioScope II Sound Equipment Calibration and Setup Procedure A01825"

2.5 Calibration Procedure: Single Level AudioScope

- **Calibration:**
  Materials Required: Audiometer Handle Test specification A00277
  1 sheet (This is the process.)
  Electronics Module Test Specification, A00273
  2 sheets (These are the specifications.)

__Note__ :A note appearing on the specification reads"Exact Measurements are not required for 100% inspection". This note does not apply to sound settings. ***__Adjust the AudioScope according to the printed sound settings and their tolerances as shown on the print.__***

__Your Sequence:__	*__Original Step number from A00277:__*		*__Modifications if any:__*
• **2.5.6** ____	step 1	**Start Button**	Check for smooth operation.
• **2.5.6** ____	step 2	**On/Off Switch**	
• **2.5.7** ____	step 3	**L.E.D.s**	LED.s must be bright.
• **2.5.8** ____	step 4	**Rattle**	
• **2.5.9** ____	step 7	**Cover**	
• **2.5.10**____	step 8	**Pneumatic Seal**	Check seal before sound.
• **2.5.11**____	step 5	**Sound Level**	
• **2.5.12**____	step 9	**Charge**	
• **2.5.13**____	step 10	**Lamp Ejector**	
• **2.5.14**____	step 11	**Trained Listener**	

Calibration is complete.
If Single level AudioScope does not take calibration, unit is not serviceable. Customer should be advised that unit is obsolete, parts are not available . Lamp, battery, and charging system can be used on new AudioScope 3.

2.6 Multi Level AudioScopes (AudioScope#) 23300
(ASIC TYPE) up to and including serial no.9609999

- **Incoming bench checks**: Prepare the AudioScope for calibration.
  - 2.6.1 ___ Check the tightness of the two slotted screws near battery positive spring
  - 2.6.2 ___ Check the tightness of the charger jack
  - 2.6.3 ___ Remove RTV from the potentiometers
  - 2.6.4 ___ Check that the sound tube extends at least 1/16" to 1/8" into the cavity behind the lens. If it does not, move it upwards with long nose pliers taking care not to bend or crush the sound tube. See Figure 2.5.4

- **Preparation of Sound Equipment:**
  - 2.6.5 ___ Set up your sound equipment as per "AudioScope II Sound Equipment Calibration and Setup Procedure A01825"

- **Calibration:**

  Materials Required: Audiometer Handle Test Specifications A00277
  1 sheet (This is the process.)
  Electronics Module Test Specification, A00985
  1 sheet (These are the specifications.)

<u>Note</u>: A note appearing on the specification reads "Exact Measurements are not required for 100% inspection". This note does not apply to sound settings.
<u>Adjust the AudioScope according to the printed sound settings and their tolerances as shown on the print.</u>

<u>Sequence:</u>	*<u>Original Step number from A00277:</u>*		*<u>Modifications if any:</u>*
• **2.6.6 ____**	step t1	**Start Button**	Check for smooth operation.
• **2.6.7 ____**	step t2	**On/Off Switch**	
• **2.6.8 ____**	step 3	**L.E.D.s**	LED.s must be bright.
• **2.6.9 ____**	step 4	**Rattle**	
• **2.6.10____**	step 7	**Cover**	
• **2.6.11____**	step 8	**Pneumatic Seal**	**Check seal before sound.**
• **2.6.12____**	step 5	**Sound Level**	
• **2.6.13____**	step 9	**Charge**	

2.6 Multi Level AudioScopes 23300 (ASIC TYPE) up to and including serial no.9609999

- **Calibration:** Continued

Sequence:	***Original Step number from A00277:***	***Modifications if any:***
• **2.6.14____**	step 10	**Lamp Ejector**
• **2.6.15____**	step 11	**Trained Listener**

Calibration is complete.

If AudioScope3 (ASIC) does not take calibration, proceed to troubleshooting section. After repair of the AudioScope3, calibrate. If the unit cannot be repaired, replace the failed AudioScope 3 ASIC board with a new style Microcontroller based board and calibrate it according to instructions in Section 2.7.

2.7 Calibration Procedure, Multi Level AudioScopes
23300 (<u>MICROCONTROLLER</u> type, serial no.9670000 and higher)

- **Incoming bench checks**: Prepare the AudioScope 3 for calibration.
  - **2.7.1** ___ Check the tightness of the two slotted screws near battery positive spring.
  - **2.7.2** ___ Check the tightness of the charger jack.
  - **2.7.3** ___ Check that the sound tube extends at least 1/16" to 1/8" into the cavity behind the lens. If it does not, move it upwards with long nose pliers taking care not to bend or crush the sound tube.

- **Preparation of Sound Equipment:**
  - **2.7.4** ___ Set up your sound equipment as per "AudioScope II Sound Equipment Calibration and Setup Procedure A01825"

- **Calibration:**

  Materials Required: Audiometer Handle Test Specifications A00277
  1 sheet (This is the process.)
  Electronics Module Test Specification, A00985
  1 sheet (These are the specifications.)

<u>Note</u> :A note appearing on the specification reads"Exact Measurements are not required for 100% inspection". This note does not apply to sound settings. ***<u>Adjust the AudioScope according to the printed sound settings and their tolerances as shown on the print.</u>***

<u>Your Sequence:</u>	*<u>Original Step number from A00277:</u>*	*<u>Modifications if any:</u>*
• **2.7.5** ____	step 1 **Start Button**	Check for smooth operation.
• **2.7.6** ____	step 2 **On/Off Switch**	
• **2.7.7** ____	step 3 **L.E.D.s**	LED.s must be bright.
• **2.7.8** ____	step 4 **Rattle**	
• **2.7.9** ____	step 7 **Cover**	
• **2.7.10**____	step 8 **Pneumatic Seal**	**Check seal before sound.**

2.7 Calibration Procedure, Multi Level AudioScopes
23300 (MICROCONTROLLER type, serial no.9670000 and higher)
(continued)

- **2.7.11______** step 5 **Sound Level: Follow steps "a" - "h" below.**

a___ Set Run/Cal switch on T-13765 to ***"RUN"*** position.

b___ Attach AudioScope Calibration Box T-13765 to
8 pin header connector with orange wire of T-13765 connector towards crystal.

c___ Turn AudioScope3 On and set to "25 dB"
Observe Green LED. It should be lit.

d___ Place the RUN/CAL switch on the cal box to the ***"CAL"*** position. The green READY light should flash. The orange PT (PreTone) light should be on.

e___ Use the 1000 Hz filter on the B&K, adjust the PreTone level to the specified level per A00985 (in Section 5 of this manual), using the UP and DOWN buttons on T-13765. (The level will change in prescribed increments each time the buttons are depressed.

f___ When desired level is set, depress the SAVE & INCR button. The handle will move to the next tone to be adjusted.

Repeat above sequence for all remaining frequencies. Select correct filter on B&K.

g___ Switch unit to 40 dB. Repeat above process only checking readings are in tolerance, but not making adjustments. Switch unit to 20 dB. Repeat checking.

h___ Switch the RUN/CAL switch RUN position. Microcontroller AudioScope3 is now calibrated, and will run with new settings.

- **2.7.12_____** step 9 **Charge**
- **2.7.13_____** step 10 **Lamp Ejector**
- **2.7.14_____** step 11 **Trained Listener**

Calibration is complete. If AudioScope3 (Microcontroller) does not take calibration, proceed to troubleshooting section. After repair of the AudioScope3, calibrate.

Section 3:

Troubleshooting

3.1 Troubleshooting AudioScope 3 s/n <=969999 (ASIC)

Complaint	Cause	Corrective Action
Unit does not turn on. **Green LED does not light.**	Low battery voltage.	**Substitute** with charged test battery and retest. **Replace** battery. **Retry.** If green LED remains unlit, **replace** board.
	Cold solder joint at battery terminal.	**Restore** connection by **reflowing** joint (using T19102-2).
	Defective contact in power jack will not close when charge plug is removed.	**Replace** power jack.
Low battery voltage	Defective power jack	**Replace** housing.
	Defective charging circuit	**Inspect** circuit. **Restore.**
Speaker does not produce tones.	Cold solder joint at speaker or wire to PCB.	**Restore** connection by **reflowing** joint (using T19102-2).
	Broken speaker wire	**Repair** wire.
	Defective speaker	**Replace** speaker.
	No voltage at TP2	**Replace** Board
4-K range does not calibrate.	Defective speaker	**Replace** Speaker. If still does not cal, **replace** PCB and **retest.**
Housing fails air seal test.	Gasket not seated correctly	**Remove** lens assembly and **rotate** 180 degrees. **Reinstall** and **retest.**
	Leaking Lens Gasket	**Replace** housing.
	Leaking Stabilizing Grommet	**Replace**
	Defective housing	**Replace** housing.
Halogen lamp does not light.	Low battery voltage.	**Recharge or replace** battery.
	Defective halogen lamp.	**Replace.**
Handle does not charge.	Bent or broken charging contacts in charging well.	**Re-shape** contact(s) **Replace** Housing Assembly
Excessive battery drain.	Shorted lamp.	**Replace** Lamp.

3.2 Troubleshooting AudioScope 3 s/n >=970000
(MICROCONTROLLER / NON-ASIC)

Complaint	Cause	Corrective Action
Unit does not turn on. **Green LED does not light.**	Low battery voltage.	**Substitute** with charged test battery and **retest.** **Replace** battery. **Retry**. If green LED remains unlit, **replace** board.
	Cold solder joint at battery terminal.	**Restore** connection by **reflowing** joint (using T19102-2).
	Defective contact in power jack will not close when charge plug is removed.	**Replace** power jack.
Low battery voltage	Defective power jack	**Replace** housing.
	Defective charging stand	**Check** circuit and restore.
Speaker does not produce tones.	Cold solder joint at speaker or wire to PCB.	**Restore** connection by reflowing joint (using T19102-2).
	Broken speaker wire	**Repair** wire.
	Defective speaker	**Replace** speaker.
	No voltage at TP2	**Replace** Board
Does not calibrate at *a particular* frequency.	Defective speaker	**Replace** Speaker. If still does not cal, replace PCB and retest.
Does not calibrate *at any* frequency.	Call box plugged in backwards.	**Plug** cal box connector into PCB with orange wire towards crystal.
PRETONE L.E.D. is blinking	Unit needs calibration.	**Calibrate**
Housing fails air seal test.	Gasket not seated correctly	**Remove** lens assembly and **rotate** 180 degrees. **Reinstall.**
	Leaking Lens Gasket	**Replace** housing.
	Leaking Stabilizing Grommet	**Replace.**
	Defective housing	**Replace** housing.
Halogen lamp does not light.	Low battery voltage.	**Recharge** or **replace** battery.
	Defective halogen lamp.	Replace lamp.
Handle does not charge.	Bent or broken charging contacts in charging well.	**Re-shape** contact(s) **Replace** Housing Assembly
Excessive battery drain.	Shorted lamp.	Replace Lamp.

Section 4:

Disassembly and Repair

4.1 Disassembly Procedure, AudioScope3

Caution: The battery and lamp become very hot during operation.
Allow ten minutes of cool-down time before opening unit.

Abstract: The Printed Circuit Board and power jack are easily removed from the handle housings. The spring steel charger well contacts on the handle are spring steel and will snap when attempting to spread them too far. The mini-transducer (speaker) and sound tube are easily removed from the board without removing the board from the handle housing. The rubber gasket that seals the sound tube to the AudioScope head is called a Stabilizing Grommet. This grommet can be changed if it leaks air. Air leaks can deteriorate the performance of the instrument. Air leaks are a result of rough handling and resultant broken seals in the housing halves, or bad gaskets around the lens and or the stabilizing grommet.
Lens gaskets are installed during assembly before right and left side cases are bonded together. Replacement is not covered in this manual.

4.1.1 Prepare the unit for disassembly or service

___ **Turn** the LOCKED/OPEN knob on the bottom of the AudioScope to OPEN (the two lines should meet together at the bottom). Use a flathead screwdriver or coin.

___ **Slide** the top of the housing backwards, exposing the battery and board.

___ **Lift** the battery out by pulling upwards on the positive end.

___ **Remove** the lamp by pressing the blue button on the board.

4.1.2 Speaker removal

___ Do not try to pull the sound tube out of the boot since the boot end of the sound tube is flared.

___ Gently push the speaker boot (containing the speaker) off of the metal spring clip.

___ Gently pull the speaker out of the boot.

___ Note the position of the red and black wires relative to the imprinting on the speaker and un-solder them (using T19102-2).

4.1.3 Speaker replacement

___ Solder red and black wires to new speaker in the order noted above (in step 4.1.3) .

___ Gently press the speaker into the speaker boot.

4.1 Disassembly Procedure, AudioScope3
(continued)

4.1.4 Stabilizing Grommet removal *(sound tube gasket near lamp)
- ___ Slide the speaker boot off of the clip and pull the sound tube out of the stabilizing grommet.
- ___ Peel the old grommet out of the ring at the end of the board.
- ___ Install new grommet by carefully pressing it into the ring.
- ___ Insert the sound tube into the stabilizing grommet and then slide the speaker boot (containing the speaker) onto the spring clip.
- ___ Adjust the height of the sound tube so that approximately 1/8" extends into the housing behind the lens. See Figure 2.5.4
- ___ Perform a leak check on the instrument after replacing stabilizing grommet.

4.1.5 Printed circuit board removal
- ___ Unscrew two screws at the positive terminal end of the circuit board.
- ___ Pull the board towards the battery compartment and carefully lift the board out.

4.1.6 Power jack removal
- ___ Unscrew jack ring nut with T-10912
- ___ Un-solder (using T19102-2) three connections on back of jack.
- ___ Remove jack from housing.

Reassembly

4.1.7 Install power jack
- ___ Put jack through hole in housing so that three tabs line up with components.
- ___ Restore connections by soldering (using T19102-2) three components to tabs on jack.

4.1.8 Place board into housing
- ___ Place the switch on the housing on the "off" position.
- ___ Place the switch mounted on the circuit board to the 40 dB position, toward the yellow LED.
- ___ Position the sound tube gasket into the hole in head of the instrument. The 5/16" round rubber ring will line up with the end of the fiber optic bundle.
- ___ Gently push the board back into its original position. The tab of the switch will engage the cavity of the switch button.

4.1 Disassembly Procedure, AudioScope3
(continued)

4.1.9 Prepare the unit for functional check and calibration.

___ Place a known good lamp into the unit.

___ Place a known good, charged battery into the unit.

___ Perform full functional check per A specifications

___ Check frequency and amplitude / Calibrate unit.

4.2 Disassembly Procedure, Charging Stand.

Abstract: The Charging Stand disassembles to three main components: the base plate, the holder, and the housing assembly. If the internal circuit board fails, replace the housing assembly. Bent charging contacts cannot be replaced since they are heat-staked into the housing assembly.

4.2.1 Prepare charger stand unit for disassembly.

- ___ Unplug charging transformer from mains.
- ___ **Remove** specula.

4.2.2 Base plate assembly removal.

- ___ Unscrew four screws holding the base plate assembly to the housing assembly.
- ___ Push the base out of the housing (if it sticks) with the handle of a screwdriver or small hammer.
- ___ Lift the holder (top portion of the charging stand) out of the housing.

4.2.3 Rubber feet.

- ___ Push old rubber feet out of base plate.
- ___ Push replacement feet into holes in base plate.

4.2.4 Reassemble.

- ___ Slide holder into housing assembly. Do not crush contacts.
- ___ Place base into housing assembly.
- ___ Attach base to housing assembly with four screws.

4.2.5 Test

- ___ Connect a known good charger to the Charging Stand jack.
- ___ Put a "known good" handle into the charging well.
- ___ Charging light will light if stand is functioning normally.

Section 5:

Drawings / Test Specifications

5.1 Drawings and Test Specifications

This section contains the following documents for service and calibration of AudioScopes.

Drawing#	Description	Size/# sheets
A02030	Repair Calibration Spec. for AudioScope II	B/1 of 1
A00277	Audiometer Handle Test Specifications	D/1 of 1
A00984	P.C.B. Test Spec AudioScope II	D/1 of 1
A00273	Electronics Module Test Specification	D/1 of 2
A00273	Electronics Module Test Specification	D/2 of 2
A00985	Audio Module III Test Spec	D/1 of 1
A01825	AudioScope III Sound Equipment Calibration and Setup	C/1 of 1
A00942	Charging Stand Electrical Test Spec.	A/1 of 1
230230	Audio II Schematic (PCB for ASIC version)	D/1 of 1
230215	PC Board Ass'y (for ASIC version	D/1 of 1
236630	PCB Schematic (for Microcontroller version)	B

Parts catalog pages

230137-3	Nos.23000,23020,23040 AudioScope	A/1 of 1
230237-1	No. 23300 AudioScope II and 3	A/1 of 1
711408-2	No. 71123 Charging Stand	A/1 of 1

REV	REVISION DESCRIPTION	ECN	DATE	APPROVAL
A	RELEASE TO PROD. ENG.	5-19006	5/5/89	

THE FOLLOWING MEASUREMENTS ARE TO BE PERFORMED PER A00965. IF THE MEASUREMENT IS NOT WITHIN THE SPECIFICATION LISTED BELOW, THEN THE INSTRUMENT IS TO BE READJUSTED FOR THAT PARAMETER. READJUSTMENT MAY BE MADE IN THE SAME HANDLE. IF THE INSTRUMENT CANNOT BE READJUSTED SUCH THAT THE NEW MEASUREMENT IS WITHIN SPECIFICATION, THEN IT SHALL BE REPAIRED OR THE PC BOARD SHALL BE REPLACED.

FREQUENCY: ±3 DB, FOR MEASUREMENT PURPOSES, CANNOT BE READJUSTED.

SOUND LEVEL: ±3 DB AT 500, 1000, AND 2000 HZ, ±4 DB AT 4000 HZ, ±3 DB AT PRETONE (1000 HZ).

THE FOLLOWING ADDITIONAL MEASUREMENTS ARE TO BE FOR ONE TONE ONLY. THE RESULTS SHOULD MATCH THOSE OF • TABLE 1, IF THE MEASUREMENT IS NOT WITHIN THE SPECIFICATION LISTED, THEN THE INSTRUMENT SHALL BE REPAIRED OR THE PC BOARD SHALL BE REPLACED.

• NOTE: MEASUREMENTS AND SPECIFICATIONS IN TABLE 1 ARE FOR THE 1000 HZ (SECOND PULSE) ONLY.

REMOVE AUDIOSCOPE BOARD FROM THE HANDLE AND INSERT IT INTO SPECIAL TEST FIXTURE. APPLY DC POWER AND HOOK OSCILLOSCOPE UP TO TEST FIXTURE.

MAKE THE FOLLOWING OSCILLOSCOPE SETTINGS:

CH. 1 - DC - 20 OR 50 MSEC
POSITION KNOB - 11 O'CLOCK
STORE MODE - NORMAL
TIME/DIV - 2 SEC.
COUPLING - HF REJ
SOURCE - CH. 1

MAKE SURE THE GREEN LIGHT IN THE UNIT BEING TESTED IS ON. PRESS THE START BUTTON ON THE AUDIOSCOPE II BOARD AND RECORD ENTIRE SEQUENCE IN A STORAGE OSCILLOSCOPE.

YOU SHOULD NOW HAVE A TRACE SIMILAR TO THAT IN FIG. 1. SAVE THE TRACE AND INCREASE HORIZONTAL MAGNIFICATION BY 10. SET UP THE POSITIONING TO VIEW THE SECOND PULSE IN THE PULSE TRAIN (1000 HZ).

TO MEASURE THE RISE TIME MEASURE THE TIME (HORIZONTAL DISTANCE) BETWEEN POINTS INDICATED BY "A" AND "B" ON FIG. 2. THE TIME IN MILLISECONDS SHOULD BE WITHIN THE TOLERANCES LISTED IN TABLE 1.

TO MEASURE THE ON TIME MEASURE THE TIME BETWEEN THE POINTS INDICATED BY C AND D IN FIG. 2. THE TIME IN SECONDS SHOULD BE WITHIN THE TOLERANCES LISTED ON TABLE 1.

TO MEASURE THE OFF TIME POSITION THE DISPLAY, USING THE LEFT RIGHT POSITION KNOB, SO YOU CAN MEASURE THE TIME BETWEEN POINTS D AND E AS INDICATED ON FIG. 2. THE TIME IN SECONDS SHOULD BE WITHIN THE TOLERANCES LISTED ON TABLE 1.

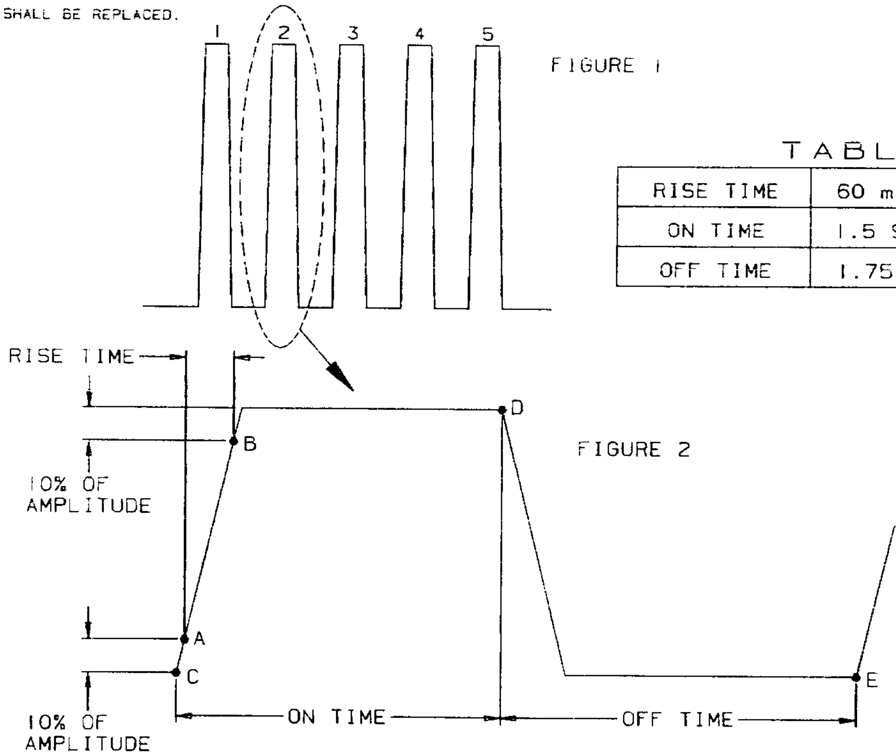


FIGURE 1

FIGURE 2

TABLE 1

RISE TIME	60 mSec. ±40 mSec.
ON TIME	1.5 Sec. ±.1 Sec.
OFF TIME	1.75 Sec. ±.1 Sec.

MATERIAL:

FINISH:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
TOLERANCES ON:		
BASIC DIMENSION	.XX	.XXX
UP TO 6	±.02	±.005
ABOVE 6 TO 24	±.03	±.010
ABOVE 24	±.06	±.015
ANGLES: ± 1/2 DEGREE		

DRAWN R.J.GAMBUZZA	DATE 5/5/89
CHECKED	
APPROVED	
REL. FOR PROD.	
DO NOT SCALE	

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: REPAIR RECALIBRATION SPEC. FOR AUDIOSCOPE II

CODE IDENT.	DRAWING NO.	REV.
B	A02030	A

SCALE N/A

SHEET 1 OF 1

REV	DESCRIPTION	ECN	INIT	DATE	APPR
J	REDRAWN ON CAD, REM'D NOTE 6 & FIG 3	31879	SB	1-17-86	

FIG 1 L.E.D. TEST

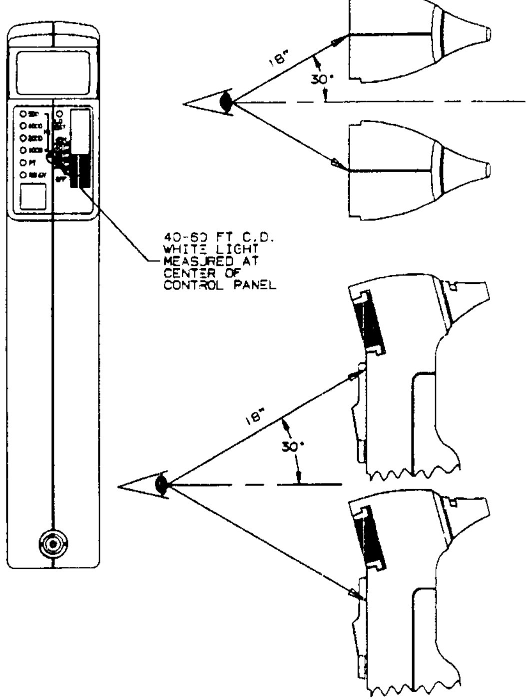
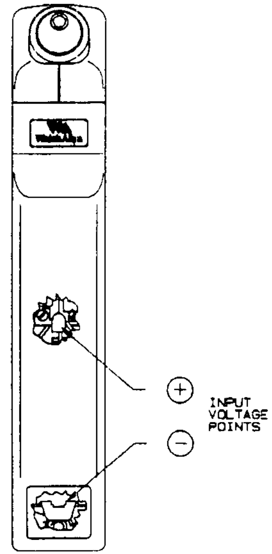


FIG 2 POWER CONNECTIONS



AUDIOSCOPE HANDLE TEST SPECIFICATION

AT THE COMPLETION OF ASSEMBLY, EACH HANDLE SHALL BE SUBJECTED TO ALL TESTS LISTED BELOW. NO HANDLE SHALL BE SHIPPED NOR STOCKED WHICH DOES NOT MEET ALL TEST CRITERIA.

†1. START BUTTON: THE START BUTTON SHALL ACTIVATE WITH A FORCE OF 0.5 - 1.0 LBS.

†2. ON/OFF SWITCH: THE SLIDE SWITCH SHALL OPERATE WITH A LONGITUDINAL FORCE OF 0.5-4.0 LBS (SLIDING "ON") AND 1.0-5.0 LBS (SLIDING "OFF").

3. L.E.D.'S: ALL L.E.D.'S SHALL BE OF SUFFICIENT BRIGHTNESS TO BE BE VISIBLE UNDER CONDITIONS OF NORMAL AMBIENT ILLUMINATION AND VIEWING ANGLE. ANY UNITS THAT ARE QUESTIONABLE MAY BE TESTED BY VIEWING 18" AWAY AT A 30° CONICAL ANGLE WITH 40-60 FT CANDLES OF WHITE LIGHT ILLUMINATION ON THE CONTROL PANEL. (SEE FIGURE 1). THE UNIT IS ACCEPTABLE IF ALL L.E.D.'S ARE VISIBLE AT ALL ANGLES.

4. RATTLE: THERE SHALL BE NO PERCEIVABLE NOISE GENERATED WHEN THE HANDLE IS SHAKEN.

*5. SOUND LEVEL: THE SOUND LEVEL OF ALL TONES SHALL BE RECHECKED PER THE SPECIFICATIONS OF A00273 (AUDIOSCOPE I) OR A00985 (AUDIOSCOPE II) (ELECTRONICS MODULE TEST SPECIFICATION). THE MEASURED LEVELS SHALL BE WITHIN ±1.5dB, ±2.0 dB @ 4000 Hz (AUDIOSCOPE I) OR ±1.0 dB, ±1.5 dB @ 4000 AND 500 Hz (AUDIOSCOPE II) OF THE DESIRED LEVELS. THE SOUND LEVEL SHALL NOT BE READJUSTED TO MEET THIS SPECIFICATION.

7. COVER: THE COVER SHALL SLIDE ON AND OFF AND LOCK IN POSITION WITHOUT UNDUE FORCE.

8. PNEUMATIC SEAL: THE INSTRUMENT SHALL BE CONNECTED TO AN AIR SOURCE WHICH GENERATES 200CC/MIN. FLOW UNOCCLUDED, AND 500MM H_2O PRESSURE WHEN OCCLUDED. THE SEAL IS ACCEPTABLE IF THE PRESSURE DEVELOPED EXCEEDS 254MM H_2O WITH THE INSTRUMENT CONNECTED. (SEE FIGURE 4). THE INCLUDED AIR VOLUME OF THE TEST SYSTEM SHOULD BE MINIMIZED.

9. CHARGE: THE UNIT SHALL NOT OPERATE WHEN THE CHARGER IS CONNECTED WITH AN INPUT OF 120V ±2V, 60 Hz TO A MODEL 71040 CHARGER. THE CHARGING CURRENT DELIVERED TO THE HANDLE SHOULD BE 75-100 mA (AS MEASURED ON A D.C. AVERAGING METER). (SEE FIGURE 5.)

* 10. LAMP EJECTOR: SEE TEST SPEC A00273 (AUDIOSCOPE I) OR A00985 (AUDIOSCOPE II).

* 11. TRAINED LISTENER: SEE TEST SPEC A00273 (AUDIOSCOPE I) OR A00985 (AUDIOSCOPE II).

* THESE TESTS ARE ONLY REQUIRED IF THE ELECTRONIC MODULE WAS NOT CALIBRATED IN THIS PARTICULAR HANDLE, OR IF THE MODULE WAS REMOVED FROM THE HANDLE.

† EXACT MEASUREMENTS ARE NOT REQUIRED FOR 100% INSPECTION.

FIG 4 PNEUMATIC SEAL

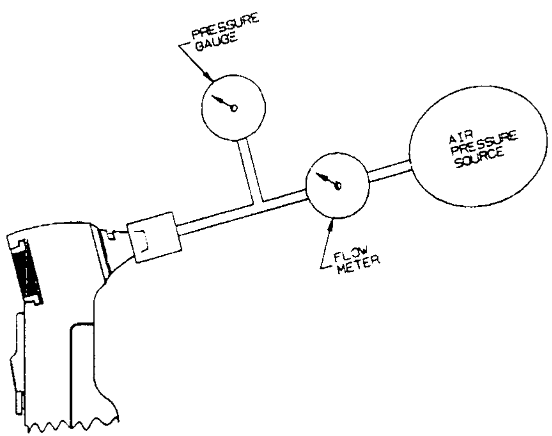
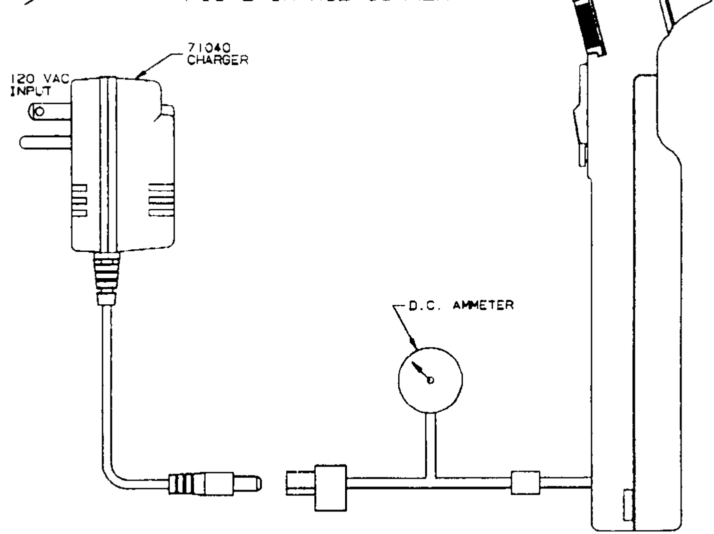


FIG 5 CHARGE CURRENT



SUPERSEDES DWG DATED 12-20-82

MATERIAL: ~	PART NO.		DESCRIPTION	
	DRAWN CPW S BUERKLE	DATE 12-20-82 1-17-86	Welch Allyn SKANEATELES FALLS, NEW YORK U.S.A.	
FINISH: ~	DESIGNED		TITLE: AUDIOMETER HANDLE TEST SPECIFICATIONS	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE PLATING -TOLERANCES- .XX = ±.02 ANGLES: ±1/2° .XXX = ±.005 TOLERANCES PER ANSI Y14.5 REMOVE BURRS & SHARP EDGES EXTERNAL THDS = CLASS - 2A INTERNAL THDS = CLASS - 2B	CHECKED CLW	1-20-83		
	APPROVED JWH	1-20-83	CODE IDENT 64475 D	DRAWING NO. A00277 REV J
	REL. TO PROD RDS	2-7-83	SCALE 1 : 1	DO NOT SCALE SHEET 1 OF 1

D A00984 J

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
A	REL TO PROD ENG	5-14124	CRW	9/30/86	RRB
B	REM'D LAMP & LAMP EJECTOR; ADD'D NOTE	5-14164	CRW	10/16/86	RRB
C	REV'D NOTES 3, 8 & 12	5-15737	CRW	9/4/87	JJS
D	REV'D NOTES 7,9,10,11 & 12	5-15855	CRW	9/30/87	JJS
E	REV'D NOTES 3,7,8,10 & 11; DELETED NOTE 12; 1.75±0.50 WAS 1.5 $^{+0.3}_{-0.1}$; 17.5±0.5 WAS 17.25 $^{+0.4}_{-0.2}$	5-16291	CRW	12/8/87	JJS
F	REV'D NOTE 8	5-17104	CRW	5/3/88	JJS
G	REV'D NOTES 3 & 8	5-17531	CRW	7/14/88	JJS
H	REV'D NOTE 8	5-18285	CRW	12/8/88	JJS
J	REV'D NOTES 3 & 9	5-28720	SB	7-7-94	CCF

FIGURE 1 TIMING DIAGRAM

INDIVIDUAL TONE AND SPACE ERRORS ARE NON-CUMULATIVE

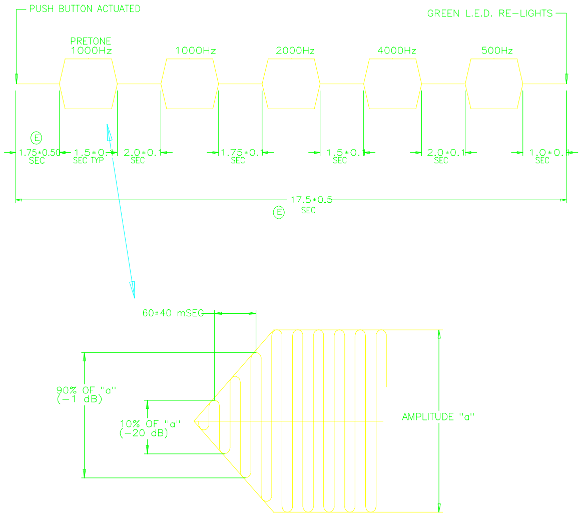
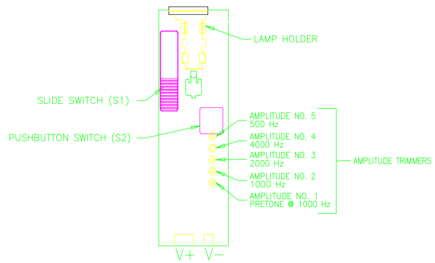


FIGURE 2

SOLDER SIDE OF P.C.B SHOWN



NOTES:

(B) REFER TO AUDIOSCOPE II SCHEMATIC (DWG 230230) FOR ALL TEST POINT LOCATIONS. FOR THE PURPOSES OF THIS TEST. A JUMPER BETWEEN TEST POINT NO. 1 AND GROUND (NEGATIVE INPUT TERMINAL) MAY BE USED TO "LATCH" EACH TONE "ON" FOR PURPOSES OF MEASUREMENT.

1. 3.50±0.01 V.D.C. IS APPLIED TO THE INPUT VOLTAGE TERMINALS (SEE FIGURE 2).

2. AN AUDIO AMPLIFIER AND SPEAKER ARE CONNECTED TO THE OUTPUT TERMINALS (TWISTED LEADS).

(C) (E) (G) (J) 3. THE FIVE AMPLITUDES ARE SET TO THE FOLLOWING VOLTAGES:

FREQ (Hz)	OUTPUT @ T.P.2 (mV R.M.S.)	TOLERANCE (mV R.M.S.)
PT	400	±25
1000	40	±5
2000	185	±25
4000	110	±20
500	50	±5

4. THE SLIDE SWITCH (S1) IS TURNED "ON" TO THE 40 dB LEVEL SETTING. THIS IS THE SWITCH POSITION CLOSEST TO THE YELLOW L.E.D.

5. THE GREEN L.E.D. SHOULD LIGHT.

6. THE START BUTTON (S2) IS PUSHED.

(D) (E) 7. THE FIVE RED L.E.D.'S SHOULD ILLUMINATE SEQUENTIALLY. THE DURATION OF THE TONES SHOULD BE APPROXIMATELY 1.5 SEC. THE INTERVAL BETWEEN TONES IS VARIED AS SPECIFIED ON FIGURE 1. AN AUDIO TONE SHOULD BE HEARD WHEN EACH L.E.D. LIGHTS (THE TONES MAY BE OF VARIED AMPLITUDE AND/OR FREQUENCY). AT THE END OF THE SEQUENCE, THE GREEN L.E.D. SHOULD RELIGHT. THE TIME BETWEEN ACTUATION OF THE PUSHBUTTON AND RELIGHTING OF THE GREEN L.E.D. SHALL BE AS SHOWN IN FIGURE 1. INPUT CURRENT SHALL NOT EXCEED 30 mA DURING ANY PORTION OF THE CYCLE.

(C) (E) (G) (F) (H) 8. THE INPUT VOLTAGE IS DECREASED TO 3.1 V, THE GREEN L.E.D. SHOULD GO OUT AND THE YELLOW L.E.D. SHOULD LIGHT. THE INPUT SHOULD THEN BE INCREASED AND THE GREEN L.E.D. SHOULD RELIGHT AT 3.2 TO 3.55 V. ONLY ONE L.E.D. SHOULD BE ON AT A TIME. NEITHER L.E.D. SHOULD FLICKER.

(D) 9. LATCH-UP

A. THE PUSHBUTTON SWITCH SHALL BE DEPRESSED MOMENTARILY. THE GREEN L.E.D. SHALL GO OUT AND THE FIVE RED L.E.D.'S SHALL ILLUMINATE SEQUENTIALLY.

B. WHEN EACH RED L.E.D. LIGHTS IT SHALL BE "LATCHED ON" BY CONNECTING TEST POINT NO. 1 TO GROUND (NEGATIVE INPUT TERMINAL). IT MAY BE "UNLATCHED" BY DISCONNECTING THE TEST POINT FROM GROUND.

C. FOR EACH L.E.D. THE FOLLOWING MEASUREMENTS AND ADJUSTMENTS SHALL BE MADE:

1) FREQUENCY – THE OUTPUT FREQUENCY SHALL BE MEASURED BY THE ELECTRICAL SIGNAL BETWEEN TEST POINT NO. 2 AND GROUND. THE FREQUENCY INDICATION SHALL BE WITHIN ±1.0% OF THAT SHOWN BELOW. THE FREQUENCIES SHALL BE STABLE WITHIN ±1 Hz DURING THE FIRST 2 SEC AFTER SELECTION.

TONE NO.	FREQ (Hz)
1	1000
2	1000
3	2000
4	4000
5	500

(J) 2) DISTORTION – THE TOTAL HARMONIC DISTORTION FOR EACH TONE (EXCLUDING PRETONE (PT)) SHALL BE MEASURED FROM TEST POINT NO. 2 TO GROUND. THE T.H.D. SHALL NOT EXCEED 3.0%. A 30 KHz LOW PASS FILTER SHOULD BE USED WHEN MAKING THIS MEASUREMENT.

(D) (E) 10. NORMAL CYCLE

THE GREEN L.E.D. SHOULD RELIGHT AFTER THE PRECEDING TEST SEQUENCE. THE PUSHBUTTON SWITCH SHALL BE DEPRESSED AGAIN, MOMENTARILY, AND THE FOLLOWING PARAMETERS CHECKED DURING THE NORMAL OPERATION OF THE MODULE:

A. RISE/FALL TIME – EACH TONE SHALL RISE AND FALL IN AMPLITUDE IN A GRADUAL MANNER. THE RISE AND FALL TIMES SHALL BE 60±40 mSEC AS MEASURED BY THE DIFFERENCE BETWEEN THE 10% AND 90% POINTS IN VOLTAGE AT TEST POINT NO. 2. (SEE FIGURE 1) THE ACTUAL RISE/FALL TIME NEED ONLY BE VERIFIED ON ONE TONE.

B. TIMING – THE DURATION OF TONES AND PAUSE BETWEEN THEM AS SHOWN IN FIGURE 1 SHALL BE CHECKED. THIS CAN BE MEASURED BY THE ELECTRICAL SIGNAL BETWEEN TEST POINT NO. 2 AND GROUND.

AN ALTERNATE WAY OF CHECKING THE TIMING IS TO PROBE PIN 14 OF THE I.C. THIS WILL BE A DIGITAL SIGNAL WITH THE DURATION OF THE HIGH PULSE BEING THE TONE "ON" TIME AND THE DURATION OF THE LOW PULSE BEING THE "OFF" TIME.

(D) (E) 11. SECOND CYCLE

THE MODULE SHALL BE PUT THROUGH ANOTHER CYCLE (BY ACTUATING THE PUSHBUTTON SWITCH) TO TEST THE RESTART FUNCTION.

RESTART – AT ANY POINT DURING THE CYCLE, THE PUSHBUTTON SWITCH IS DEPRESSED. ANY L.E.D. THAT WAS LIT SHOULD GO OUT AND THE NORMAL SEQUENCING SHOULD START OVER.

QTY 504	QTY 503	QTY 502	QTY 501	ITEM OR SYMBOL	PART NUMBER	DESCRIPTION
						LIST OF MATERIAL

MATERIAL: ~ FINISH: ~

REF. DWGS

UNLESS OTHERWISE SPECIFIED:
METRIC DIMENSIONS (WHEN USED) ARE IN ( ).
DIMENSIONS INCLUDE PLATING.
REMOVE BURRS & SHARP EDGES.
THREADS ARE UNIFIED SERIES AND INCLUDE PLATING:
EXTERNAL THDS = CLASS-2 A
INTERNAL THDS = CLASS-2 B

GROUP OR PART	NEXT ASS'Y	QTY	USED ON
	APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:

BASIC DIMENSION	.XX	.XXX
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .06	± .015

ANGLES: ± 1/2 DEGREE

DO NOT SCALE

	NAME	DATE
DRAWN	CR WOJNOWICZ	9/10/86
CHECKED	J SAROFEEN	9/12/86
APPROVED	R BLACK	9/12/86
REL.FOR PROD.	B CAMPAGNA	10/3/86

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: P.C.B. TEST SPEC AUDIOSCOPE II

CODE IDENT. 64475 | D | DRAWING NO. A00984 | REV. J

SCALE ~ SHEET 1 OF 1

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
A	RELEASE TO PROD. ENG.	5-6952	MGS	1-10-83	[signature]
B	SEE SHEET 2.	6-7372	MGS	4-20-83	[signature]
C	34.5 DB WAS 34.8 DB 32.3 DB WAS 32.7 DB 37.7 DB WAS 37.9 DB SEE SHEET 2.	5-7457	MGS	5-5-83	[signature]
D	SEE SHEET 2	5-7786	[initials]	6-29-83	[signature]
E	SEE SHEET 2.	5-7939	MGS	8-8-83	[signature]
F	SEE SHEET 2.	5-8057	MGS	8-26-83	[signature]
G	REM'D FREQ. TRIMMER CALLOUT, SEE SHEET 2.	5-8265	MGS	10-18-83	[signature]
H	SEE SHEET 2 OF 2.	5-8717	MGS	2-6-84	[signature]
J	SEE ECN	5-9689	MGS	8-10-84	[signature]
K	ADD'D SPL CHART	5-10743	MGS	3-8-85	[signature]
L	CHANGED 230085-501 TO T1393 ALSO ON SHEET 2	5-17623	CFH	8-11-88	[signature]

FIG. #1 TEST SET-UP

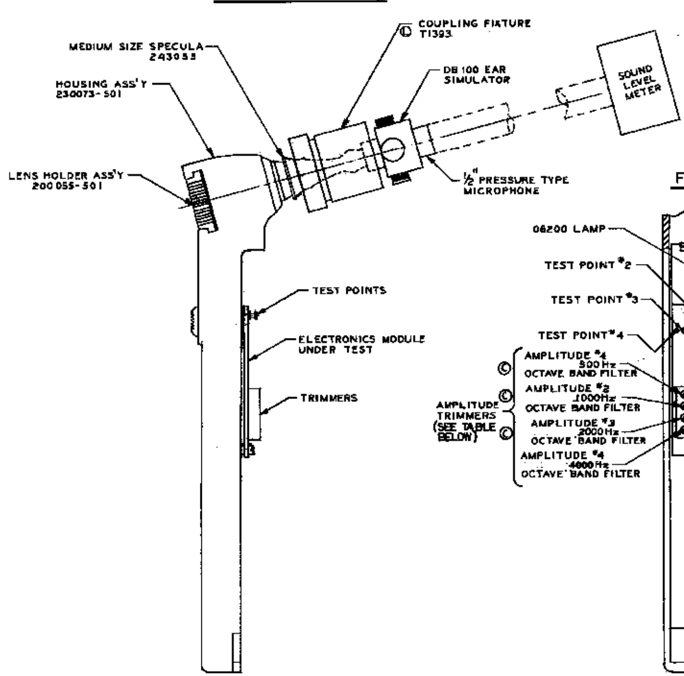


FIG #2

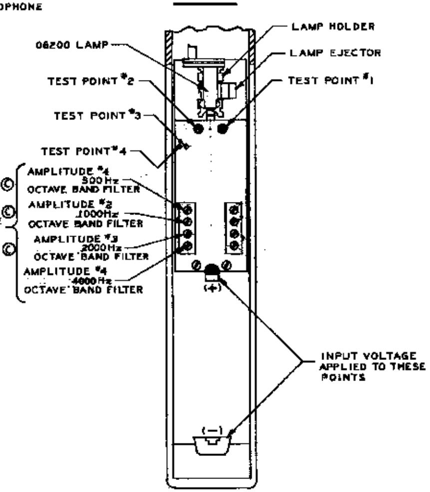
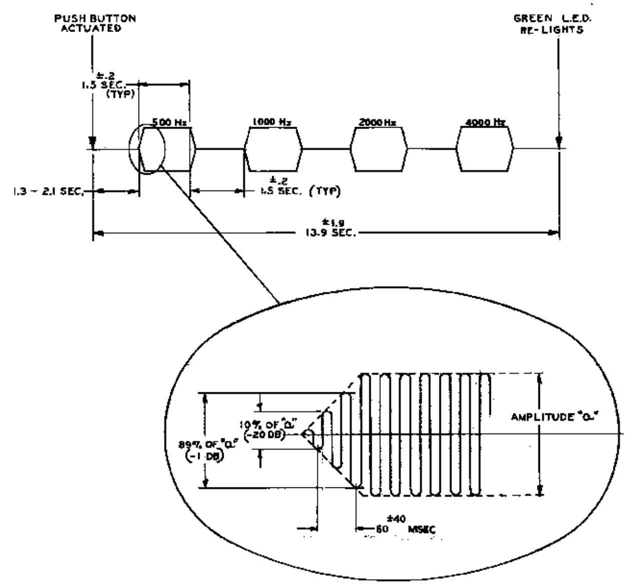


FIG. #3 TIMING DIAGRAM



Ⓚ

230001 ASS'Y NO.	DB. HL LEVEL	SOUND LEVEL DB. re 20μ Pa.			
		500 HZ.	1000 HZ.	2000 HZ.	4000 HZ.
−501	25	34.9	32.3	37.7	38.9
−502	20	29.9	27.3	32.7	33.9
−503	40	49.9	47.3	52.7	53.9

NOTE: SEE SHEET 2 FOR NOTES

MATERIAL: ~ FINISH: ~

LIST OF MATERIAL (QTY 504 / 503 / 502 / 501, ITEM OR SYMBOL, PART NUMBER, DESCRIPTION)

UNLESS OTHERWISE SPECIFIED: METRIC DIMENSION (WHEN USED) ARE IN ( ). DIMENSIONS INCLUDE PLATING. REMOVE BURRS & SHARP EDGES. THREADS ARE UNIFIED SERIES AND INCLUDE PLATING. EXTERNAL THDS = CLASS 2 A. INTERNAL THDS = CLASS 2 B

REF. DWGS: 230000

NEXT ASS'Y	QTY	USED ON
230001-501		23007

GROUP OR PART — APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:		
BASIC DIMENSION	.XX	.XXX
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .05	± .015

ANGLES ± ¼ DEGREE

DO NOT SCALE

DRAWN: CFH — DATE: 12-17-82
CHECKED: [signature] — 12-30-82
APPROVED: [signature] — 12-30-82
REL. FOR PROD.: RDB — 1-11-83

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: ELECTRONICS MODULE TEST SPECIFICATION

CODE IDENT. 64478 — D — DRAWING NO. A00273 — REV. K

SCALE ~ — SHEET 1 OF 2

A00273

ELECTRONICS MODULE TEST SPECIFICATION

(G) AT THE COMPLETION OF ASSEMBLY, EACH MODULE SHALL BE SUBJECTED TO THE TESTS LISTED BELOW. NO MODULE SHALL BE SHIPPED NOR STOCKED WHICH DOES NOT PASS ALL TEST CRITERIA. 100% INSPECTION IS NOT REQUIRED ON THOSE TESTS MARKED WITH AN ASTERISK (*). THE TESTS SHALL BE PERFORMED IN THE ORDER LISTED BELOW. TESTING SHALL BE IMMEDIATELY DISCONTINUED ON ANY MODULE THAT FAILS A TEST OR CANNOT BE ADJUSTED TO AN ACCEPTABLE VALUE. ALL TESTS INVOLVING SOUND LEVEL MEASUREMENT SHALL BE MADE IN AN AMBIENT SOUND LEVEL AT LEAST 10db. BELOW THE DESIRED LEVEL BEING MEASURED (db. SPL REL. TO 20 uPa WITH APPROPRIATE OCTAVE FILTER).

DURING THE SOUND LEVEL MEASUREMENT TEST, THE MODULE MUST BE SECURED TO A 230075-501 HOUSING ASSEMBLY AS SHOWN IN 230000-501 (AUDIOMETER ASSY). LENS HOLDER ASSY 200055-501 IS ALSO ADDED.

(J) A CHARGED 72300 BATTERY OR AN EXTERNAL POWER SOURCE OF 3.50 ±0.10 V.D.C. SHALL BE APPLIED TO THE INPUT TERMINALS OF THE MODULE. THE HOUSING ASSY SHALL BE COUPLED TO AN OCCLUDED EAR SIMULATOR (PER ANSI STD. NO. S3.25-1979; MAY BE PURCHASED FROM INDUSTRIAL RESEARCH PRODUCTS, INC. PART NO. DB 100) VIA A WELCH ALLYN NO. 243055 MED. SIZE SOFT TIP SPECULA AND NO. T1393 COUPLING FIXTURE. (SEE FIG. 1.) CARE MUST BE TAKEN TO PROVIDE AN ACOUSTIC SEAL BETWEEN ALL COMPONENTS.

START-UP

1. THE SLIDE SWITCH IS MOVED TO THE POSITION CLOSEST TO THE L.E.D.'S. THE GREEN L.E.D. ONLY, SHALL BECOME IMMEDIATELY ILLUMINATED.

QUICK CHECK

THIS TEST IS OPTIONAL. IT MAY BE USED TO RAPIDLY ASSESS THE FUNCTIONALITY OF A MODULE. THE SOUND LEVEL METER MICROPHONE OUTPUT IS AMPLIFIED AND DRIVES A LOUDSPEAKER. THE PUSHBUTTON SWITCH IS ACTUATED. A SERIES OF FOUR TONES SHOULD BE HEARD WHICH COINCIDE WITH SEQUENTIAL LIGHTING OF THE FOUR RED L.E.D.'S. THE GREEN L.E.D. SHOULD RE-LIGHT AT THE END OF THE CYCLE.

LATCH-UP

1. THE PUSHBUTTON SWITCH SHALL BE DEPRESSED MOMENTARILY. THE GREEN L.E.D. SHALL GO OUT AND THE FOUR RED L.E.D.'S SHALL ILLUMINATE SEQUENTIALLY.

2. WHEN EACH RED L.E.D. LIGHTS, IT SHALL BE "LATCHED ON" BY CONNECTING TEST POINT NO. 1 TO GROUND (NEGATIVE SIDE OF BATTERY). IT MAY BE "UNLATCHED" BY DISCONNECTING THE TEST POINT FROM GROUND

3. FOR EACH L.E.D., THE FOLLOWING MEASUREMENTS AND ADJUSTMENTS SHALL BE MADE:

(G) A.* FREQUENCY - THE OUTPUT FREQUENCY SHALL BE MEASURED BY THE ELECTRICAL SIGNAL BETWEEN TEST POINT NO. 2 AND GROUND. THE FREQUENCY INDICATION SHALL BE WITHIN ±1.0% OF THAT SHOWN BELOW. THE FREQUENCIES SHALL BE STABLE WITHIN ±1 HZ DURING THE FIRST 2 SEC. AFTER SELECTION.

TONE NO.	FREQ. (HZ.)
1	500
2	1000
3	2000
4	4000

(G) (C) B.* DISTORTION - FOR THIS TEST, A FULLY CHARGED MOD. 72300 BATTERY MUST BE ASSEMBLED TO THE HANDLE (AS SHOWN IN DWG. 230000-501 AUDIOMETER ASSY) AND USED TO POWER THE MODULE. TEST POINTS 3 AND 4 SHALL BE CONNECTED TOGETHER ELECTRICALLY FOR THIS TEST. IN ORDER TO GENERATE MAXIMUM AMPLITUDE, A NO. 06200 LAMP SHALL BE IN THE LAMP HOLDER AND ILLUMINATED, DURING THE TEST. THE TOTAL HARMONIC DISTORTION FOR EACH TONE SHALL BE MEASURED FROM TEST POINT NO. 2 TO GROUND. THE T.H.D. SHALL NOT EXCEED 3.0%.

C. SOUND LEVEL - THE SOUND LEVEL MEASURED AT THE EAR SIMULATOR, USING THE APPROPRIATE OCTAVE BAND FILTER SHALL BE ADJUSTED TO THE VALUES SHOWN BY USING THE APPROPRIATE TRIMMER (SEE FIG. 2).

THE ADJUSTMENT SHALL YIELD A LEVEL INDICATION WITHIN ±0.20 db. OF THE DESIRED. THE LEVEL SHALL BE STABLE WITHIN ±0.1 db DURING THE 2 SEC. PERIOD FOLLOWING THE INITIAL RISE.

NORMAL CYCLE

THE GREEN L.E.D. SHOULD RELIGHT AFTER THE ABOVE TEST SEQUENCE. THE PUSHBUTTON SWITCH SHALL BE DEPRESSED AGAIN, MOMENTARILY AND THE FOLLOWING PARAMETERS CHECKED DURING THE NORMAL OPERATION OF THE MODULE:

A. CURRENT DRAIN - THE CURRENT DRAIN FROM THE 3.5 V.D.C. SUPPLY SHALL NOT EXCEED 100 mA DURING ANY PORTION OF THE CYCLE.

B. TONE SHUT-OFF - THE SOUND PRESSURE LEVEL MEASURED AT THE EAR SIMULATOR SHALL DROP AT LEAST 15 db. AFTER EACH TONE (USING OCTAVE BAND FILTER OF PRECEDING TONE).

C. RISE/FALL TIME - EACH TONE SHALL RISE AND FALL IN AMPLITUDE IN A GRADUAL MANNER. THE RISE AND FALL TIMES SHALL BE 60 ±40 MSEC. AS MEASURED BY THE DIFFERENCE BETWEEN THE -1 AND -20 db. POINTS IN VOLTAGE AT TEST POINT 2. THESE POINTS ARE IN DB RELATIVE TO MAX. ENVELOPE AMPLITUDE (SEE FIG. 3).

(G) D. TIMING - THE DURATION OF TONES AND PAUSE BETWEEN THEM SHALL BE CHECKED. THIS SHALL BE MEASURED BY THE ELECTRICAL SIGNAL BETWEEN TEST POINT 2 AND GROUND.

* 1. "ON" TIME - THE "ON" TIME, AS MEASURED FROM THE START OF THE "RISE" TO THE INITIATION OF THE "FALL" SHALL BE 1.5 ±0.2 SEC. (SEE FIG. 3).

* 2. "OFF" TIME - THE "OFF" TIME, AS MEASURED FROM THE INITIATION OF THE "FALL" TO THE START OF THE NEXT "RISE" SHALL BE 1.5 ±0.2 SEC. (SEE FIG 3).

* 3. START UP TIME - THE TIME BETWEEN ACTUATION OF THE PUSHBUTTON AND THE START OF THE RISE OF THE FIRST TONE SHALL BE 1.3 - 2.1 SEC.

* 4. OVERALL TIME - THE TIME BETWEEN ACTUATION OF THE PUSHBUTTON AND RE-LIGHTING OF THE GREEN L.E.D. SHALL BE 13.9 ±1.9 SEC.

SECOND CYCLE

THE MODULE SHALL BE PUT THROUGH ANOTHER CYCLE (BY ACTUATING THE PUSHBUTTON SWITCH) TO TEST THE RESTART AND LOW BATTERY FUNCTIONS.

(G) * 1. RESTART - AT ANY POINT DURING THE CYCLE, THE PUSHBUTTON SWITCH IS DEPRESSED. ANY L.E.D. THAT WAS LIT SHOULD GO OUT AND THE NORMAL SEQUENCING SHOULD START OVER.

(F) (D) (G) * 2. LOW BATTERY - THE INPUT VOLTAGE IS GRADUALLY DECREASED. THE GREEN L.E.D. SHOULD GO OUT AND THE YELLOW L.E.D. SHOULD LIGHT AT A VOLTAGE BETWEEN 3.10 AND 3.40V.

ONLY ONE L.E.D. SHOULD BE "ON" AT A TIME. NEITHER L.E.D. SHOULD FLICKER.

TRAINED LISTENER

AS A FINAL TEST, A PERSON WITH NORMAL HEARING (STABLE, PURE-TONE AIR CONDUCTION THRESHOLDS OF 15 DB. H.L. OR LESS BETWEEN 500 AND 4000 Hz.) SHALL LISTEN TO THE INSTRUMENT IN A QUIET ROOM. (ROOM SOUND LEVELS AT LEAST 10 DB. BELOW THE TONE LEVELS AT EACH OCTAVE BAND). THEY SHALL LISTEN FOR THE FOLLOWING: (H)

a.) INTENSITY OF TONES

b.) QUALITY OF TONES

c.) START/STOP OF TONES

d.) EXTRANEOUS NOISE BETWEEN TONES (ESPECIALLY HIGH PITCHED SQUEALS OR STATIC).

THEY MAY REJECT INSTRUMENTS THAT VARY SIGNIFICANTLY FROM AN INSTRUMENT OF KNOWN CALIBRATION AND QUALITY.

LAMP EJECTOR

WHILE THE MODULE IS IN A 230000-501 AUDIOMETER ASSY, A 06200 LAMP SHALL BE INSERTED INTO THE LAMP HOLDER. THE LAMP SHALL CENTER ON THE FIBER OPTIC BUNDLE AND BECOME ILLUMINATED. THE LAMP EJECTOR IS DEPRESSED. THIS SHALL EJECT THE LAMP TO A POSITION WHERE IT IS EASILY ACCESSIBLE BY HAND.

(B) BURN IN

AT COMPLETION OF ASSEMBLY AND BEFORE FINAL TESTING, ALL UNITS WILL BE POWERED UP AT THE NOMINAL OPERATING VOLTAGE. UNITS SHALL BE OPERATIONALLY CYCLED CONTINUOUSLY DURING THE BURN IN PERIOD. THE BURN IN PERIOD WILL BE A MINIMUM OF 24 HOURS. THIS PERIOD DOES'NT HAVE TO BE CONTINUOUS.

(J) (E) HOUSING ASS'Y.

THE HOUSING ASS'Y (230073-501) USED FOR INITIAL CALIBRATION SHALL CONTAIN A SPECIALLY SELECTED FIBER-SPECULUM ASS'Y (200005-502) WITH A CONE-SEATING DIMENSION OF 0.240 ±.005 AND GRIND LENGTH OF 1.63±.005

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
B	ADD'D BURN IN NOTE.	5-7372	MGS	4-20-83	[signature]
C	REV'D NOTE 3. DISTORTION SEE SHEET 1.	5-7457	MGS	5-5-83	[signature]
D	REV'D SECOND CYCLE NOTE 2: 3.10 & 3.40 V. WERE 3.00 & 3.20 V	5-7780	CWJ	6-29-83	[signature]
E	ADD'D HOUSING ASS'Y NOTE.	5-7959	MGS	8-8-83	[signature]
F	REV'D SECOND CYCLE NOTE 2 BY REMOVING INCREASE BACK TO 3.50 V.	5-8057	MGS	8-26-83	[signature]
G	REV'D - FREQ. DIST. TIMING RESTART & LOW BATT. NOTES	5-8265	MGS	10-18-83	[signature]
H	TRAINED LISTENER NOTE: 15 DB. H.L. WAS 10DB. H.L.	5-8717	MGS	2-6-84	[signature]
J	SEE ECN	5-9369	MGS	8-10-84	[signature]
K	SEE SH. 1 OF 2.	5-10742	MGS	3-8-85	[signature]
T	CHANGED COUPLING FIXTURE NO. TO T1393 WAS 230085-501	5-10623	CFH	8-11-88	[signature]

MATERIAL: ~ FINISH: ~

UNLESS OTHERWISE SPECIFIED: METRIC DIMENSION (WHEN USED) ARE IN ( ). DIMENSIONS INCLUDE PLATING. REMOVE BURRS & SHARP EDGES. THREADS ARE UNIFIED SERIES AND INCLUDE PLATING: EXTERNAL THDS - CLASS 2 A INTERNAL THDS - CLASS 2 B

REF. DWGS

GROUP OR PART	NEXT ASSY	QTY	USED ON
	APPLICATION		

QTY 504	QTY 503	QTY 502	QTY 501	ITEM OR SYMBOL	PART NUMBER	DESCRIPTION
						LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:

BASIC DIMENSION	.XX	.XXX
UP TO 6	±.02	±.005
ABOVE 6 TO 24	±.03	±.010
ABOVE 24	±.06	±.015

ANGLES: ± ½ DEGREE

DO NOT SCALE

DRAWN CFH DATE 12-17-82
CHECKED [signature] 12-30-82
APPROVED [signature] 12-30-82
REL. FOR PROD. [signature] 1-19-83

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: ELECTRONICS MODULE TEST SPECIFICATION

CODE IDENT. 64475 | D | DRAWING NO. A00273 | REV. K

SCALE ~ SHEET 2 OF 2

FIGURE 1 TEST SET-UP

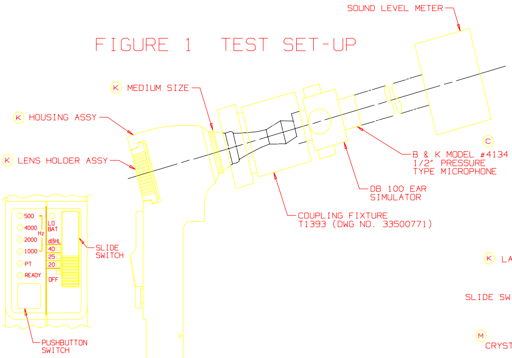
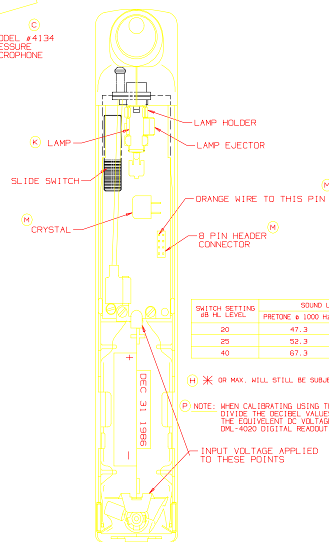


FIGURE 2



SWITCH SETTING dB HL LEVEL	SOUND LEVEL dB RE 20 uPa				
	PRETONE @ 1000 Hz	1000 Hz	2000 Hz	4000 Hz	500 Hz
20	47.3	27.3	32.7	33.9	29.9
25	52.3	32.4	37.7	38.9*	35.7
40	67.3	47.3	52.7	53.9	49.9

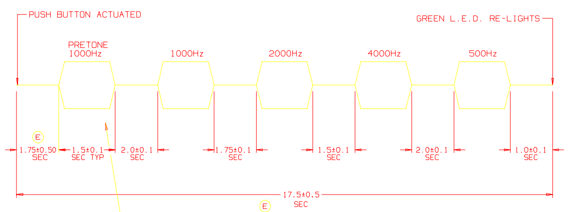
(D) (G)

(H) * OR MAX. WILL STILL BE SUBJECT TO QC MIN OF 37.0 dB.

(P) NOTE: WHEN CALIBRATING USING THE DML-4020 DATA LOGGING MULTIMETER, DIVIDE THE DECIBEL VALUES IN THE ABOVE TABLE BY 10 TO OBTAIN THE EQUIVELENT DC VOLTAGE READINGS AS DISPLAYED ON THE DML-4020 DIGITAL READOUT.

FIGURE 3 TIMING DIAGRAM (REF) (E)

INDIVIDUAL TONE AND SPACE ERRORS ARE NON-CUMULATIVE



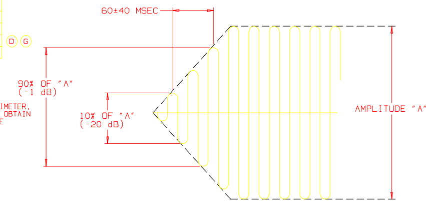


FIGURE 4 ACCEPTABLE LEVELS FOR QC PURPOSES (G)

SWITCH SETTING dBHL LEVEL	SOUND LEVEL dB RE 20uPa				
	PRETONE	1000 Hz	2000 Hz	4000 Hz	500 Hz
20	46.3-48.3	26.3-28.3	31.2-34.2	32.0-35.8	28.2-31.6
25	51.3-53.3	31.3-33.3	36.2-39.2	37.0-40.8	33.2-36.6
40	66.3-68.3	46.3-48.3	51.2-54.2	52.0-55.8	48.2-51.6

(P) NOTE: WHEN CALIBRATING USING THE DML-4020 DATA LOGGING MULTIMETER, DIVIDE THE DECIBEL VALVES IN THE ABOVE TABLE BY 10 TO OBTAIN THE EQUIVALENT DC VOLTAGE READINGS AS DISPLAYED ON THE DML-4020 DIGITAL READOUT.

REV	DESCRIPTION	ECN/ECO	INIT	DATE	CKD
A	REL TO PROD ENG	5-14124	CRW	9/30/86	RRB
B	REV'D NOTES	5-14163	CRW	10/16/86	RRB
C	REV'D NOTES: ADD'D B&K MODEL #4134	5-15768	CRW	9/11/87	RRB
D	REV'D NOTES 35.2 WAS 34.9	5-15855	CRW	9/30/87	JJS
E	1.75 ±0.50 WAS 1.5 +0.3 -0.1: 17.5 ±0.5 WAS 17.25 +0.4 -0.2: ADD'D (REF)	5-16289	CRW	12/8/87	RRB
F	REV'D NOTES	5-16487	CRW	1/19/88	RRB
G	REV'D NOTES: ADD'D FIGURE 4: 32.4 WAS 32.3: 35.7 WAS 35.2	5-16501	CRW	1/19/88	JJS
H	ADD'D NOTE TO TABLE IN FIGURE 2 & TO NOTES	5-18891	CRW	3/28/89	JJS
J	ADD'D SPECIAL NOTE	5-20770	CRW	4/2/90	JJS
K	REM'D PART NOS. FROM DWG & NOTES	5-30237	DLS	4/11/95	JDC
L	REV'D 1ST PARAGRAPH OF NOTES: REV'D NOTES FOR AUDIBLE TONE TEST	5-31878	SB	1-15-96	JDC
M	REV'D NOTE FOR TONE CALIBRATION: CHANGED RED LED'S TO ORANGE: REV'D VIEW ZONE C5	5-33635	SB	9-20-96	JDC
N	REV'D NOTE FOR TONE CALI-BRATION AND START UP	5-34050	RDB	12-2-96	JDC
P	ADD NOTE TO DECIBEL TABLE IN ZONES C5 AND C2.	5-34643	R GRAY	2/20/97	CCF
R	EDITED NOTE "FOR QC PURPOSES AND RECALIBRATION"	5-37372	R GRAY	4/29/98	ROR
-	-	-	-	-	-
-	-	-	-	-	-

NOTES:

(N) (L) AT THE COMPLETION OF ASSY, EACH MODULE SHALL BE SUBJECTED TO THE TESTS BELOW. THE TONE CALIBRATION PROCEDURE MUST BE DONE PRIOR TO ANY OTHER TEST. NO MODULE SHALL BE SHIPPED OR STOCKED WHICH DOES NOT PASS ALL TEST CRITERIA. TESTING SHALL BE IMMEDIATELY DISCONTINUED ON ANY MODULE THAT FAILS A TEST OR CANNOT BE ADJUSTED TO AN ACCEPTABLE VALUE. ALL TESTS INVOLVING SOUND LEVEL MEASUREMENT SHALL BE MADE IN AN AMBIENT SOUND LEVEL AT LEAST 10 dB BELOW THE DESIRED LEVEL BEING MEASURED (dB SPL REL TO 20uPa WITH APPROPRIATE OCTAVE FILTER).

DURING THE SOUND LEVEL MEASUREMENT TEST, THE MODULE MUST BE SECURED TO A HOUSING ASSEMBLY AS SHOWN IN 23301 AUDIOSCOPE II ASSEMBLY.
(K) LENS HOLDER ASSEMBLY IS ALSO ADDED.
(F) THE SOUND MEASUREMENT EQUIPMENT SHOULD BE SET UP PER W.A. SPECIFICATIONS.
(B) A CHARGED 72301 BATTERY OR AN EXTERNAL POWER SOURCE OF 3.50±0.10 V.D.C. SHALL BE APPLIED TO THE INPUT TERMINALS OF THE MODULE. THE HOUSING ASSY SHALL BE COUPLED TO AN OCCLUDED EAR SIMULATOR (PER ANSI STD NO. 53.25-1979: MAY BE PURCHASED FROM INDUSTRIAL RESEARCH PRODUCTS, INC. PART NO. DB100) VIA A WELCH ALLYN MEDIUM SIZE SOFT TIP SPECULA AND NO. T1393 COUPLING FIXTURE (SEE FIGURE 1). CARE MUST BE TAKEN TO PROVIDE AN ACOUSTIC SEAL BETWEEN ALL COMPONENTS.
(F) THE LAMP SHALL BE DISCONNECTED BY DEPRESSING THE LAMP EJECTOR BUTTON.

START UP

(N) (D) (C)
1. THE SLIDE SWITCH IS MOVED TO THE 25 dB POSITION. IF THE PCB HAS BEEN CALIBRATED THEN, THE GREEN L.E.D. SHALL BECOME IMMEDIATELY ILLUMINATED. IF THE PCB HAS NOT BEEN CALIBRATED THEN THE PRETONE L.E.D. WILL FLASH. THE TONE CALIBRATION PROCEDURE MUST BE DONE PRIOR TO ANY OTHER TEST.

QUICK CHECK

(M) THIS TEST IS OPTIONAL. IT MAY BE USED TO RAPIDLY ASSESS THE OPERATION OF A MODULE. THE SOUND LEVEL METER MICROPHONE OUTPUT IS AMPLIFIED AND DRIVES A LOUD-SPEAKER. THE PUSHBUTTON SWITCH IS ACTUATED. A SERIES OF FIVE TONES SHOULD BE HEARD WHICH COINCIDE WITH SEQUENTIAL LIGHTING OF THE FIVE ORANGE L.E.D.'S. THE GREEN L.E.D. SHOULD RELIGHT AT THE END OF THE CYCLE.

TONE CALIBRATION

(L) (K) (B) (N) (M) (D) ATTACH THE T13765 AUDIOSCOPE CALIBRATION BOX TO THE 8 PIN HEADER CONNECTOR ON THE HANDLE'S PCB ASSEMBLY. THE ORANGE WIRE OF THE CAL BOX CONNECTOR SHOULD FACE THE END NEAREST THE CRYSTAL. ATTACH THE MICROPHONE AS SHOWN IN FIG 1. SLIDE THE SWITCH TO THE 25dBHL ON POSITION. PLACE THE RUN/CAL SWITCH ON THE CAL BOX TO THE CAL POSITION. THE GREEN READY LIGHT SHOULD FLASH AND THE ORANGE (PT) PRETONE LIGHT SHOULD BE ON. USING THE 1000Hz FILTER ON THE B&K, ADJUST THE PRETONE LEVEL TO THE VALUE SHOWN IN TABLE 4 BY USING THE UP AND DOWN BUTTONS ON THE CAL BOX. THE LEVEL WILL CHANGE IN INCREMENTS EACH TIME THE BUTTONS ARE DEPRESSED.

IF THE CENTER OF THE RANGE IS NOT ATTAINABLE SELECT A POINT TOWARDS THE UPPER HALF OF THE RANGE

AFTER THE PROPER LEVEL IS SET, DEPRESS THE SAVE & INCREMENT BUTTON ON THE CAL BOX AND THE HANDLE WILL MOVE TO THE NEXT TONE TO BE ADJUSTED. REPEAT THIS SEQUENCE FOR ALL THE REMAINING FREQUENCIES REMEMBERING TO SELECT THE CORRECT FILTER ON THE B&K. IT IS IMPORTANT TO SAVE AND INCREMENT AFTER THE 500Hz LEVEL BEFORE CHANGING THE dB LEVEL.

(G) (D) (C) B. ONCE THE PROPER ADJUSTMENT HAS BEEN MADE FOR ALL FREQUENCIES, THEN MOVE THE SWITCH TO THE +20 dB SETTING AND VERIFY THAT THE PROPER SOUND LEVELS FOR THAT SETTING ARE ACHIEVED WITHIN THE LIMITS SPECIFIED IN THE TABLE IN FIGURE 4. REPEAT THIS STEP FOR THE +40 dB SWITCH SETTING.

NORMAL CYCLE

(N) (C) THE GREEN L.E.D. SHOULD RELIGHT AFTER THE ABOVE TEST SEQUENCE. THE PUSHBUTTON SWITCH SHALL BE DEPRESSED AGAIN, MOMENTARILY, AND THE FOLLOWING PARAMETERS CHECKED DURING THE NORMAL OPERATION OF THE MODULE:
1. CURRENT DRAIN - THE CURRENT DRAIN FROM THE 3.5 V.D.C. SUPPLY SHALL NOT EXCEED 42 mA DURING ANY PORTION OF THE CYCLE.

NORMAL CYCLE - CONT.

2. TONE SHUT OFF - THE SOUND PRESSURE LEVEL MEASURED AT THE EAR SIMULATOR SHALL DROP AT LEAST 15 dB AFTER EACH TONE (USING OCTAVE BAND FILTER OR PRECEDING TONE).

(L) AUDIBLE TONE TEST

AS A FINAL TEST, A PERSON USING AN AMPLIFIER AND HEADPHONES SHALL LISTEN TO THE INSTRUMENT IN A QUIET ROOM. (ROOM SOUND LEVELS AT LEAST 10 dB BELOW THE TONE LEVELS AT EACH OCTAVE BAND.) THE PERSON SHALL LISTEN FOR THE FOLLOWING:

A. START/STOP OF TONES
B. EXTRANEOUS NOISE BETWEEN TONES (ESPECIALLY HIGH PITCHED SQUEALS OR STATIC)

THE PERSON MAY REJECT INSTRUMENTS THAT VARY SIGNIFICANTLY FROM AN INSTRUMENT OF KNOWN CALIBRATION AND QUALITY. THIS TEST IS TO BE REPEATED FOR ALL THREE SWITCH SETTINGS. INSTRUMENT SETTINGS FOR THIS TEST ON DWG A01825.

LAMP EJECTOR

(L) (K) WHILE THE MODULE IS IN A 23301 AUDIOSCOPE III, A LAMP SHALL BE INSERTED INTO THE LAMP HOLDER. THE LAMP SHALL CENTER ON THE FIBER OPTIC BUNDLE AND BECOME ILLUMINATED. THE LAMP EJECTOR IS DEPRESSED. THIS SHALL EJECT THE LAMP TO A POSITION WHERE IT IS EASILY ACCESSIBLE BY HAND.

(C) SOUND LEVEL COMPENSATION FOR CALIBRATION: (REF)

(D) THE TABLE ABOVE SHOWS ACTUAL SOUND PRESSURE LEVELS REQUIRED FOR ACCURATE CALIBRATION OF WELCH ALLYN AUDIOSCOPES. FOR BACKGROUND INFORMATION SEE ARTICLE "REFERENCE THRESHOLD SOUND PRESSURE LEVELS FOR THE WELCH ALLYN AUDIOSCOPE" WRITTEN BY GORDON R. BIENVENUE, PAUL L. MICHAEL AND JANIE O. CHAFFINCH. NOTE: THE SET POINT FOR THE 500 Hz TONE WAS CHANGED FROM 34.9 TO 35.2 dB TO IMPROVE THE MANUFACTURIBILITY OF THE UNIT. WHEN USING THE 1/2 INCH MICROPHONE AS PRE-SCRIBED IN THE FIGURE ABOVE, 10 dB SHOULD BE ADDED TO THE MEASUREMENTS TAKEN TO OBTAIN THE DESIRED VALUES IN THE CHART. SEE B & K INSTRUCTION MANUAL FOR AN ADDITIONAL EXPLANATION.

(D) FOR QC PURPOSES AND RECALIBRATION

(G) WHEN CHECKING TONE LEVELS, CHECK EACH TONE AT EACH LEVEL TO BE WITHIN THE LEVELS SHOWN IN THE TABLE IN FIGURE 4.

(M) (F) ®

(H) ON RECALIBRATION, ANY UNIT OUT OF SPEC SHOULD BE SET TO THE TABLE IN FIGURE 2 AND THEN CHECKED TO THE TABLE IN FIGURE 4.

(J) SPECIAL NOTE: YELLOW L.E.D. LIGHT FLASHING IS NORMAL DURING POWER UP. THIS INDICATES THAT THE LOW BATTERY DETECTION CIRCUIT IS WORKING.

PART NO.	DESCRIPTION
-	-

DRAWN	CR WOJNOWICZ	DATE	9/9/86
APPROVED	R BLACK	DATE	9/12/86
REL TO PROD	B CAMPAGNA	DATE	10/3/86

Welch Allyn®

MATERIAL: _

FINISH: _

CAD SOFTWARE: CADRA
TRANSLATED FROM: ANVIL

UNLESS OTHERWISE SPECIFIED
TOLERANCES .XX = ±.02 .XXX = ±.005 ANGLES ±2°
DIMENSIONS ARE IN INCHES

TITLE: AUDIO MODULE III TEST SPEC

D | DRAWING NO. A00985 | REV R

SCALE 1 : 1 | SHEET 1 OF 1

C	A01825	B

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
A	REL TO PROD ENG		CRW	1/19/88	RRB
B	REV NOTES 2 & 3, ADD 4		SB	1-15-96	

B&K SOUND EQUIPMENT CALIBRATION (BAND PASS FILTER TYPE 1618, MEASURING AMPLIFIER TYPE 2610):

1. SETTINGS FOR BAND PASS FILTER:

SELECTIVITY: BANDWIDTH 1/1 OCTAVE, RECORD STEP 1/3 OCTAVE

RANGE: 2 Hz-20 KHz-A-LIN (DOWN)

FILTER CONTROL MODE: MANUAL (UP)

RECORDER: NO LIGHTS

MANUAL FILTER SELECTOR: 250 Hz

(B) 2. SETTINGS FOR MEASURING AMPLIFIER TYPE 2610:

INPUT SECTION GAIN (CALIBRATION) = 0 dB
INPUT SECTION GAIN (TEST) = 50 dB

OUTPUT SECTION GAIN (CALIBRATION) = 0 dB
OUTPUT SECTION GAIN (TEST) = 30 dB

INPUT PRE-AMP: (UP)
REF: OFF (DOWN)
POL. VOLT: 200V (DOWN)

FILTERS: EXT ON
22.4 OFF
A OFF

AVERAGING TIME: FAST

DETECTOR: NORMAL (UP)
HOLD (DOWN)
PEAK (DOWN)

(B) 3. SETTINGS FOR DATALOGGING MULTIMETER (AWS MODEL DML-4020):
SET THE METER TO THE DC VOLTAGE RANGE AND R[illegible] AS A REGULAR METER.
PRESSING THE START BUTTON WILL PRINT OUT THE CURRENT READING ON THE METER.

CALIBRATION PROCEDURE:

SWITCH PISTON PHONE SWITCH (TYPE 4220) FROM "ON" TO "BATTERY" MAKING SURE THERE IS A CLEAR AUDIBLE INCREASE IN SPEED. THIS IS A BATTERY CHECK. IF INCREASE IS NOT NOTED, REPLACE BATTERIES. SLIP BLACK COVER ON END OF PISTON.

CAREFULLY REMOVE 1/2" MIC (TYPE 4134) FROM FIXTURE - PLACE SCREEN ADAPTER ON MIC - PLACE MIC IN END OF PISTON PHONE - TURN PISTON PHONE "ON" - ADJUST INPUT PREAMP ON MEASURING AMPLIFIER TO SETTING ACCORDING TO CHART BELOW - REPLACE SCREEN ADAPTER IN STORAGE BOX - PLACE FIXTURE AND MIC TOGETHER - PLACE PISTON PHONE IN STORAGE BOX.

INPUT PREAMP SETTINGS:

IF AMBIENT PRESSURE IS: *	SET INPUT PREAMP TO:
-0.05 TO -0.15 dB	4.39 VDC
-0.15 TO -0.25 dB	4.38 VDC
-0.25 TO -0.35 dB	4.37 VDC
-0.35 TO -0.45 dB	4.36 VDC
-0.45 TO -0.55 dB	4.35 VDC

WHEN TAKING TEST READINGS, THE INPUT AND OUTPUT GAIN SELECTORS SHALL BE SET AT 50 AND 30 RESPECTIVELY, AND THE MANUAL FILTER SELECTOR SHALL BE ADJUSTED TO EACH FREQUENCY AS IT IS BEING TESTED.

* B & K BAROMETER IS ALSO GRADUATED IN dB

(B) 4. AUDIBLE TONE TEST:

SETTINGS FOR BAND PASS FILTER TYPE 1618

ALL THREE FILTERS "OFF"

SETTINGS FOR MEASURING AMPLIFIER TYPE 2610

INPUT SECTION GAIN = 10dB

OUTPUT SECTION GAIN = 0dB

SETTINGS FOR CROWN AMPLIFIER TYPE PL - 2

dB HL	SETTING
20	40
25	46
40	52

QTY 504	QTY 503	QTY 502	QTY 501	ITEM OR SYMBOL	PART NUMBER	DESCRIPTION
						LIST OF MATERIAL

MATERIAL: ~ FINISH: ~

UNLESS OTHERWISE SPECIFIED.
METRIC DIMENSIONS (WHEN USED) ARE IN ( ).
DIMENSIONS INCLUDE PLATING.
REMOVE BURRS & SHARP EDGES.
THREADS ARE UNIFIED SERIES AND INCLUDE PLATING:
EXTERNAL THDS = CLASS-2 A
INTERNAL THDS = CLASS-2 B

GROUP OR PART	NEXT ASS'Y	QTY	USED ON
APPLICATION			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:	.XX	.XXX
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .06	± .015

ANGLES: ± 1/2 DEGREE

DO NOT SCALE

		DATE
DRAWN	CR WOJNOWICZ	1/19/88
CHECKED	B CAMPAGNA	2-9-88
APPROVED	RR BLACK	2-9-88
REL. FOR PROD.	B CAMPAGNA	2-10-88

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: AUDIOSCOPE III SOUND EQUIPMENT CALIBRATION AND SETUP PROCEDURE

CODE IDENT. 64475 | C | DRAWING NO. A01825 | REV. B

SCALE NONE | SHEET 1 OF 1

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
B	RETYPED & REV'D. NOTE 3; ADD'D NOTES 3,4 & 5	5-14835	CFH	3-20-87	[signature]

At the completion of assembly, the following must be done to the stand:

1. Plug in a 71040 Charger into the jack and plug the charger into 120V A.C.

2. Insert a production model AudioScope handle (complete with battery) into the charging well and the L.E.D. shall immediately become illuminated.

3. Move handle around in a circular motion inside well, three times clockwise and three times counter clockwise.

4. Tip charging stand with handle inserted between 30° to 45° off axis. Then rotate charging stand so handle wobbles for three turns each direction.

5. If L.E.D. does not flicker consistently in same position or go out completely, unit is to be judged acceptable.

6. Repeat Steps 2 thru 5 using a production model Tympanometer handle complete with battery).

MAY 24 19[illegible]

NEXT ASS'Y	QTY	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			DRAWN: JD	DATE: 3-20-87
		TOLERANCES ON:			CHECKED	
		BASIC DIMENSION	.XX	.XXX	APPROVED: [signature]	3/20/87
		UP TO 6	± .02	± .005		
		ABOVE 6 TO 24	± .03	± .010	REL. FOR PROD.	
		ABOVE 24	± .06	± .015		
		ANGLES: ± ½ DEGREE			DO NOT SCALE	
APPLICATION		METRIC = ( )				

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

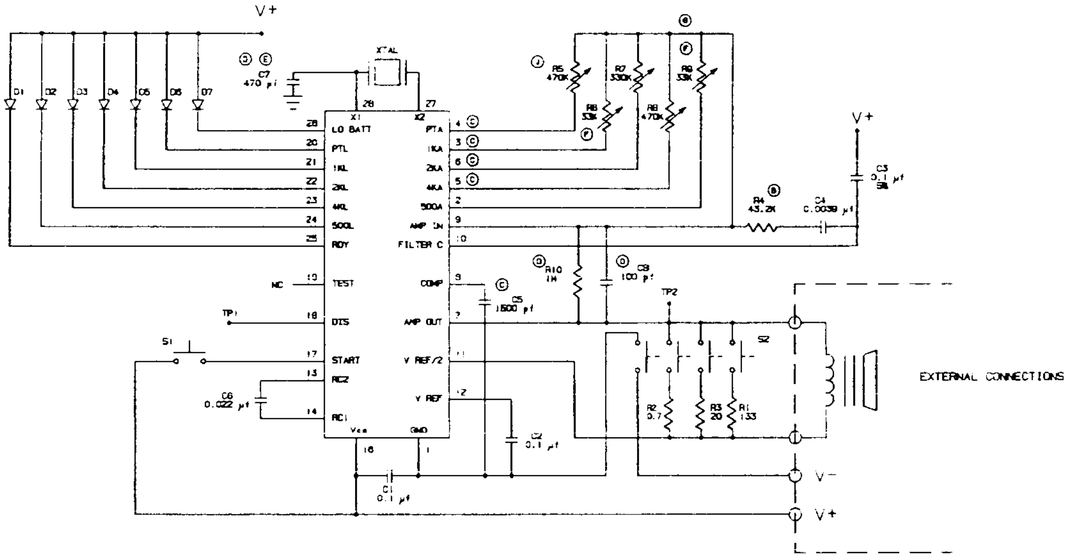
TITLE: CHARGING STAND ELECTRICAL TEST SPEC

CODE IDENT.		DRAWING NO.	REV.
64475	A	A00942	B

SCALE ~ SHEET 1 OF 1

D 230230 J

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
A	REL TO PROD ENG		CRW	9/30/86	RRB
B	43.2 K WAS 43 K (R4)		CRW	11/11/86	JJS
C	1500pf WAS 47pf (C5) REV'D PIN-OUT NUMBERS REV'D CONNECTION TO C5		CRW	12/12/86	JJS
D	ADD'D C7, C8 & R10		MGS	3/19/87	JJS
E	470pf WAS 1500pf (C7)		CRW	5/26/87	RRB
F	R6 & R8 WERE 33K		CRW	9/30/87	JJS
G	33K WAS 22K (R9)		CRW	5/3/88	JJS
H	C6 WAS 0.018uf; R2 WAS 1Ω; R1 WAS 130Ω; R6 WAS 22K; R9 WAS 330K		CRW	7/14/88	JJS
J	470K WAS 330K		SB	7-8-94	JDC



HIGHEST REF DESIG
C8
D7
R10
S2
TP2

QTY 504	QTY 503	QTY 502	QTY 501	ITEM OR SYMBOL	PART NUMBER	DESCRIPTION
						LIST OF MATERIAL

MATERIAL: ~ FINISH: ~

UNLESS OTHERWISE SPECIFIED:
METRIC DIMENSIONS (WHEN USED) ARE IN ( ).
DIMENSIONS INCLUDE PLATING.
REMOVE BURRS & SHARP EDGES.
THREADS ARE UNIFIED SERIES AND INCLUDE PLATING.
EXTERNAL THDS = CLASS-2 A
INTERNAL THDS = CLASS 2 B

REF. DWGS | GROUP OR PART | NEXT ASS'Y | QTY | USED ON | APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON: BASIC DIMENSION	.XX	.XXX
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .06	± .015

ANGLES: ± 1/2 DEGREE

DO NOT SCALE

		DATE
DRAWN	CR WOJNOWICZ	9/5/86
CHECKED	J SAROFEEN	9/12/86
APPROVED	R BLACK	9/12/86
REL. FOR PROD.	B CAMPAGNA	10/3/86

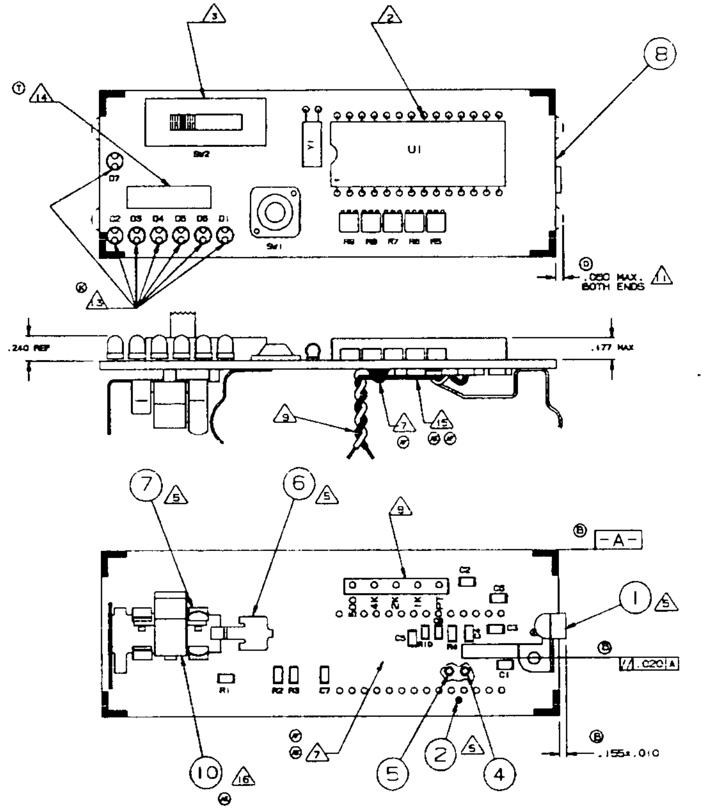
WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: AUDIO II SCHEMATIC

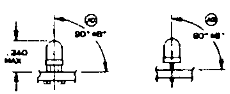
CODE IDENT. 94475 | D | DRAWING NO. 230230 | REV. J

SCALE ~ | SHEET 1 OF 1

D 230215 AJ



L.E.D. MOUNTING DETAIL



NOTES:

1. COMPONENTS ARE TO BE LOCATED AS SHOWN, AND MOUNTED SO AS TO MINIMIZE THE DISTANCE BETWEEN THE COMPONENTS AND THE PCB.

(T) 2. FOUR CORNER LEADS ARE TO BE CLINCHED INWARD ON THE IC.

3. ALL COMPONENTS EXCEPT FOR R5-R9, SW1 AND SW2 ARE TO BE WAVE SOLDER ATTACHED TO PCB USING A 60/40 EUTECTIC SOLDER. R5-R9 ARE TO BE REFLOW SOLDERED ON TOP OF PCB USING THE APPROPRIATE SOLDER PASTE. SW1 AND SW2 ARE TO BE ATTACHED AFTER WAVE AND REFLOW SOLDERING AND CLEANING OPERATIONS HAVE BEEN COMPLETED. MI1081N SWITCH LUBRICANT TO BE APPLIED TO PCB UNDER SWITCH MECHANISM. APPLY 0.2CC OF LUBRICANT HERE.

4. AN AQUEOUS BASE FLUX IS TO BE USED DURING THE SOLDERING OPERATIONS, AND FLUX REMOVAL AFTER SOLDERING SHOULD BE DONE WITH AN AQUEOUS BASED CLEANING SOLUTION. BE SURE THAT THE ASSEMBLY IS FREE OF ANY RESIDUAL CLEANING FLUID.

5. ITEMS 1,2,4,5,6 AND 7 ARE TO BE SOLDER ATTACHED TO PCB USING A 60/40 EUTECTIC SOLDER. THESE COMPONENTS CANNOT BE WAVE SOLDERED. A HAND SOLDERING OPERATION IS RECOMMENDED.

6. TEST ASS'Y PER. A00984.

(AF) (AE) (P) 7. TACK ITEMS 4 AND 5 TO PC BOARD AT THIS LOCATION USING LOCTITE 416 (M30336).

8. THIS AREA IS TO BE MASKED DURING WAVE SOLDERING OPERATION.

9. ITEMS 4 AND 5 ARE TO BE TWISTED TOGETHER AS SHOWN.

(D) 11. TAB PROTRUSIONS LEFT AFTER REMOVAL FROM ARRAY ALLOWED ON SHORT EDGES ONLY AS SHOWN.

(AF) (D) 12. BOARD IS TO BE "BURNED IN" FOR A MINIMUM OF 24 HOURS AT 140°F TO FILTER OUT INFANT FAILURES. TEST SPECIFICATIONS (A00984) ARE TO BE MET AFTER BURN IN PERIOD. A TEST DATA SHEET SHOWING CONFORMANCE TO A00984 IS TO ACCOMPANY EACH UNIT.

(K) 13. ANODE OF LED'S (LONGER LEAD) TO BE LOCATED IN THESE LOCATIONS.

(AH) (T) 14. ANY VENDOR LOT OR RUN LABELING MAY BE LOCATED IN THIS AREA. MARK WITH ASSEMBLY NO., DASH NO., REVISION LETTER AND DATE CODE (YYWW).

(AF) (AE) 15. ITEMS 4 AND 5 FLUSH AGAINST BOARD BETWEEN SOLDERED END AND TACK LOCATION.

(AE) 16. SNAP ITEM 10 (LAMP EJECTOR) INTO PLACE BY SPREADING PRONGS OF ITEM 7 (LAMP HOLDER).

(AF) 17. ASSEMBLY IS TO CONFORM TO IPC 610 AND OAP 150 WORKMANSHIP STANDARDS.

REV	REVISION DESCRIPTION	ECN	INIT	DATE	APPROVAL
A	REL. TO PROD. ENG.	E-14124	MGS	9/29/86	RRB
B	ADD'D NOTE 10, .155±.010, DATUM -A-	E-14184	MGS	10/15/86	JJS
C	REV'D PC BOARD	[illegible]	MGS	12/12/86	JJS
D	ADD'D .030 MAX BOTH ENDS WITH NOTES 11 & 12.	E-14774	MGS	3/13/87	JJS
E	ADD'D C7,C8 & R10 TO B/M	[illegible]	MGS	3/19/87	JJS
F	CHG'D C7 TO 470 pf	[illegible]	CRW	5/28/87	RRB
G	B/M CHG'D U1	[illegible]	MGS	7/1/87	RRB
H	ADDED C7,C8 & R10 TO VIEW	[illegible]	MGS	7/10/87	JJS
J	CHANGED TEST SPEC. A00984	[illegible]	MGS	9/9/87	JJS
K	ADDED NOTE 13.	[illegible]	MGS	9/9/87	JJS
L	REV'D A00984, 230230 & BOM FOR R6 & R9	[illegible]	CRW	9/30/87	JJS
M	ADD'D DATE OF BURN-IN TO NOTE 10	[illegible]	CRW	10/5/87	RRB
N	CHANGED 230210	[illegible]	CRW	10/5/87	RRB
P	REV'D NOTE 7	[illegible]	CRW	12/8/87	RRB
R	CHANGED 230216 & A00984	[illegible]	CRW	12/8/87	RRB
T	REV'D NOTE 2; ADD'D NOTE 14	E-17104	CRW	5/3/88	JJS
U	CHANGED ITEMS 4 & 5 TO 28 AWG	[illegible]	MGS	5/26/88	JJS
V	MAKE 230211 A REF. DWG.	[illegible]	EVA	7/18/88	BAC
W	REV'D A00984 & 230230 VALUES OF C8, R1, R2, R8 & R9	[illegible]	CRW	7/19/88	JJS
X	REVISED DRW 230209 AS PER VENDOR REQUEST	[illegible]	RDB	8-16-88	JJS
Y	CHANGE 230207-1 TO 230207	[illegible]	RDB	8-17-88	JJS
AA	MAKE 230004,230206,230207, & 230209 REF. DWGS.	[illegible]	MBS	9/14/88	BAC
AB	CHANGED 230296	[illegible]	MBS	10/25/88	JJS
AC	REV'D DWG A00984	[illegible]	CRW	12/8/88	JJS
AD	90°±8° WAS 90°±5° (LED)	[illegible]	MGS	2/21/89	BAC
AE	REV'D NOTE 7; ADD'D NOTES 15, 16 AND ITEM 10; -002 WAS -001	[illegible]	CRW	10/17/89	JJS
AF	REV'D NOTES 7, 12 & 15; ADD'D NOTE 17	[illegible]	CRW	12/18/89	JJS
AG	REV'D 236056, 236076.	[illegible]	SB	1-8-90	KJB
AH	REM NOTE 10, REV 14, REM ITEMS 8 & 9	[illegible]	SB	11-22-93	AJK
AJ	REV'D BOM, CHANGED R5 FROM 330K TO 470K	[illegible]	RJG	10/26/94	

QTY 504	QTY 503	QTY 502	QTY 501	ITEM OR SYMBOL	PART NUMBER	DESCRIPTION
				(AE)	THIS DWG-502	PC BOARD ASS'Y

LIST OF MATERIAL

MATERIAL: ~ FINISH: ~

UNLESS OTHERWISE SPECIFIED:
METRIC DIMENSIONS (WHEN USED) ARE IN ( ).
DIMENSIONS INCLUDE PLATING.
REMOVE BURRS & SHARP EDGES.
THREADS ARE UNIFIED SERIES AND INCLUDE PLATING.
EXTERNAL THDS = CLASS-2 A
INTERNAL THDS = CLASS-2 B

REF. DWGS

GROUP OR PART	NEXT ASS'Y	QTY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:	.XX	.XXX
BASIC DIMENSION	.XX	.XXX
UP TO 6	± .02	± .005
ABOVE 6 TO 24	± .03	± .010
ABOVE 24	± .03	± .015

ANGLES: ± 1/2 DEGREE

DO NOT SCALE

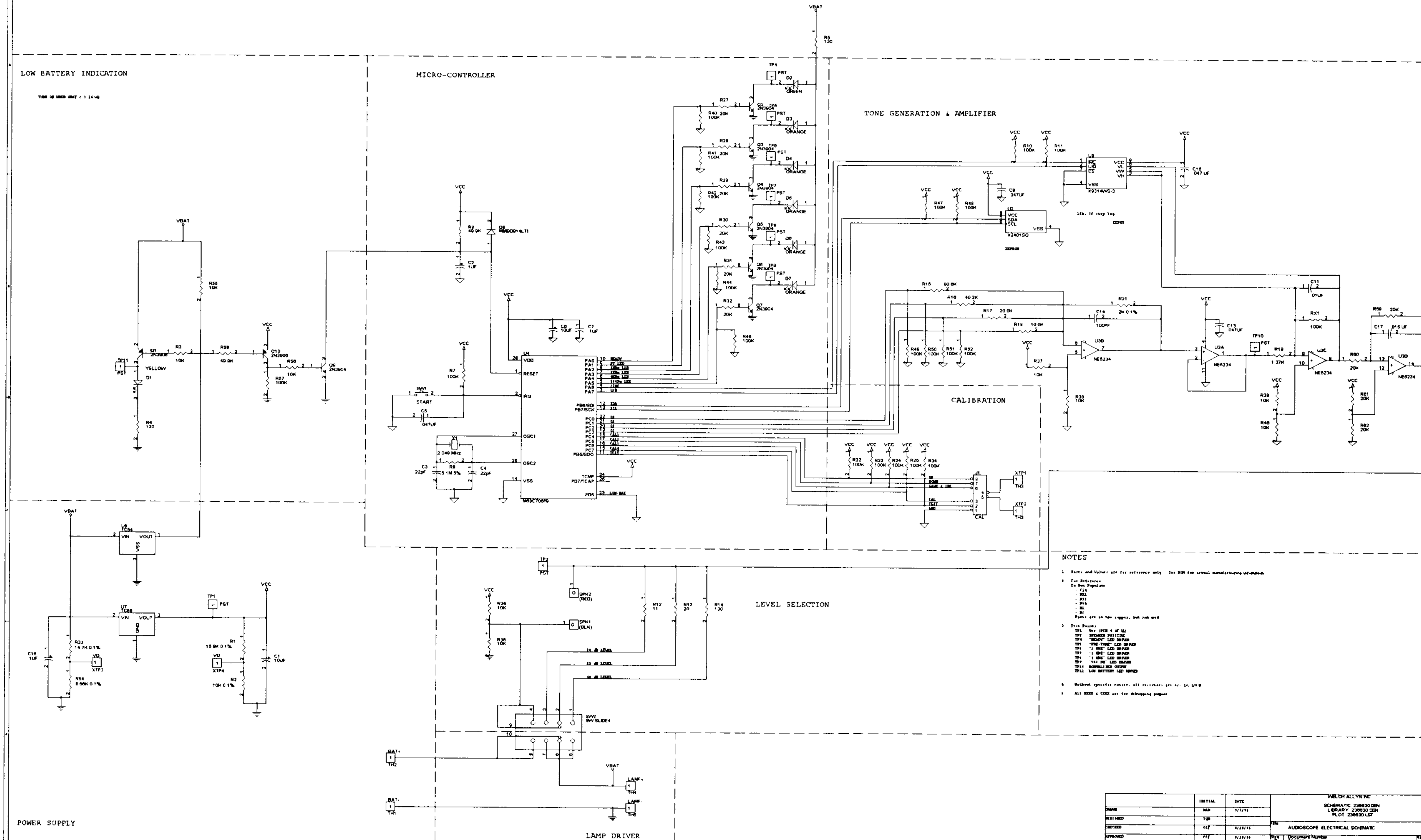
		DATE
DRAWN	H.G. SMITH	9/9/86
CHECKED	J. SAROFEEN	9/12/86
APPROVED	R. BLACK	9/12/86
REL. FOR PROD.	B. CAMPAGNA	10/3/86

WELCH ALLYN, INC.
SKANEATELES FALLS, N.Y. U.S.A.

TITLE: PC BOARD ASS'Y

CODE IDENT. 64475 | D | DRAWING NO. 230215 | REV. AJ

SCALE 2:1 | SHEET 1 OF 1



NOTES

1. Parts and Values are for reference only. See BOM for actual manufacturing information.

2. For Reference
Do Not Populate
- C14
- RX1
- [illegible]
- [illegible]
- [illegible]
- [illegible]
Parts are on the copper, but not used

3. Test Points
TP1 Vcc (PIN 4 OF U1)
TP2 SPEAKER POSITIVE
TP4 "READY" LED DRIVER
TP5 "PRE-TONE" LED DRIVER
TP6 "1 KHZ" LED DRIVER
TP7 "2 KHZ" LED DRIVER
TP8 "4 KHZ" LED DRIVER
TP9 "500 HZ" LED DRIVER
TP10 NORMALIZED OUTPUT
TP11 LOW BATTERY LED DRIVER

4. Without specific notice, all resistors are +/- 1%, 1/8 W

5. All XXXX & CXXX are for debugging purpose

	INITIAL	DATE
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